The Role of Dissociation, Conceptual Processing and PTSD Symptoms in Analogue Distressing Narratives

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A thesis submitted in partial fulfillment of the requirements for the

Degree of Master of Arts in Psychology

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2019

Acknowledgements

First and foremost, I would like to thank my supervisor Martin Dorahy for his unwavering support in this project. His knowledge of dissociation and PTSD was nothing short of inspiring, and his encouragement, dedication and guidance were instrumental in overcoming the challenges faced with completing this project. I would also like to thank my secondary supervisor Simon Kemp for his guidance with this thesis.

Secondly, I would like to thank my research partner Michelle Downs-Woolley. Her commitment to this project was outstanding and ensured smooth completion of this study. I am extremely grateful for all her support and advice, without which this project would have been far more challenging.

I would like to give a special mention to Jon Wiltshire who designed much of the technical apparatus used in this project. His expertise in building the software programs used made this experiment possible.

I am also grateful to the participants who gave up their time to complete this study. Know that your participation will contribute towards a greater understanding of PTSD, and potentially how those affected may be helped.

Finally, I would like to thank my family, Mum, Dad and Sarah for their emotional, moral and financial support during this challenging year. Also, thank you to my friends who supported my journey in completing this project.

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Abstract

Current theories of PTSD have proposed that enhanced perceptual processing and impaired conceptual processing contribute to PTSD symptoms. However, few studies have provided evidence for the role of conceptual processing during trauma. Dissociation may also be related. This study investigated whether artificially-induced dissociation impaired conceptual processing and increased the risk for PTSD symptoms. One hundred and sixty-six University students were exposed to a spinning dot (dissociation) condition, a moving picture condition or a sit quietly (control) condition at baseline, encoding and retrieval phases. They listened to a distressing narrative designed to simulate trauma (TFP-A) and recalled the narrative three days later. A word-cue association task was performed to measure conceptual priming. The induction failed to produce heightened dissociation in the spinning dot group, so spontaneous dissociation during encoding and retrieval was used as the independent variable. No differences were observed in conceptual priming across groups. In addition, no relationship was found between dissociation and analogue flashbacks, although dissociation was related to heightened distress of intrusions. The findings suggest that conceptual processing has a complex relationship with dissociation that requires further investigation.

Introduction

The cognitive mechanisms underpinning Posttraumatic Stress Disorder (PTSD) are not fully understood. Several theories propose the existence of two systems associated with the development and maintenance of PTSD: a perceptual processing system responsible for interpreting sensory information and a conceptual processing system responsible for interpreting context and meaning of an event (Brewin, 2014). During a traumatic event, cognitive dysfunction is thought to occur, such that the experience is processed and retrieved largely as perceptual representations, while less cognitive processing is devoted to conceptual elaboration. A subsequent lack of context, meaning and understanding of the event is thought to contribute to PTSD symptoms. Abnormal levels of dissociation may facilitate this process.

This thesis aims to explore the relationship between the cognitive mechanisms which function during trauma and their effect on PTSD symptoms. It uses an analogue methodological design. An overview of PTSD symptomatology is initially given, followed by an overview of perceptual and conceptual processing and their involvement in posttraumatic symptom development. To further understand this relationship, empirical studies which have investigated the effect of these processing mechanisms on PTSD symptoms will be reviewed.

This paper also investigates the role of dissociation in PTSD. While dissociation is thought to have an initial protective function during a traumatic event, it is also thought to be involved in the development and maintenance of PTSD symptoms. A current understanding suggests that dissociation may disrupt conceptual processing during a traumatic event (Olsen & Beck, 2012). However, few studies have successfully supported the relationship between impaired conceptual processing and increased levels of dissociation using an analogue design.

To address this inconsistency in the literature, this study used an audio version of the Trauma-Film Paradigm to help measure dissociation and conceptual processing in a laboratory environment. Outcome measures reflected participants' ability to demonstrate conceptual processing, and the resulting effects on PTSD symptoms (cognitive intrusions and memory recall) following exposure to a dissociation-inducing stimulus.

Overview of Post-Traumatic Stress Disorder

Symptomatology

PTSD is a collection of psychological symptoms resulting from exposure to a traumatic event, defined as involving perceived or actual death, serious injury or sexual violence (American Psychiatric Association, 2013). Many people do not experience long lasting adverse psychological symptoms after experiencing trauma. However, in some cases, abnormal cognitive processing may occur during trauma. This may alter the perception of the experience, and may change previously held cognitive beliefs an individual has about themselves, others and the world around them. This change in processing may lead to the core features of PTSD: recurring mental recollections of the distressing event, feelings of hyper-arousal, difficulty regulating or experiencing emotion and avoidance of trauma-related stimuli (including places, thoughts and feelings associated with the event) (American Psychiatric Association, 2013). An individual with PTSD will commonly report a sense of serious current threat when none is present (Brewin, Dalglish, & Joseph, 1996). According to DSM-5, symptoms must persist for at least one month following exposure to trauma to meet the clinical diagnosis of PTSD (American Psychiatric Association, 2013).

PTSD may be characterised as a memory disorder (Brewin, 2014). One of the hallmark characteristics of PTSD is the recurrence of involuntary cognitive intrusions (usually in the form of mental images), including 'flashbacks', following exposure to a traumatic incident. Studies suggest that intrusive memories of distressing events are present

in normal, non-clinical populations, with an estimated frequency of 2-4 per day (Holmes & Bourne, 2008). These may be positive or negative in affect. However, persistent intrusive images of a traumatic event (characteristic of PTSD) can cause significant distress and/or impairment in occupational functioning in an individual (Ehlers & Clark, 2000). These intrusive memories are often triggered by cues that link elements in the present situation to similar elements experienced during the trauma. For example, an individual who was involved in a serious car crash several years earlier may have a flashback of the event due to observing a similar shade of red to the car they were in during the crash. Paradoxically, PTSD victims will often report an inability to intentionally recall specific information about the traumatic event (Van der Kolk & Fisler, 1995). Information that is recalled is often disorganised and out of chronological order (Halligan, Clark, & Ehlers, 2002).

Prevalence

Although lifetime prevalence differs by trauma type and severity, PTSD affects between 2% to 9% of people globally (Atwoli, Stein, Koenen, & McLaughlin, 2015), and around 6% of people in New Zealand (Oakley Browne, Wells, & Scott, 2006). Higher rates of disorder likely reflect exposure to trauma that is interpersonal and intentional (for example, rape, conflict). The disorder occurs twice as often in women compared to men (Yehuda et al., 2015), and its age of onset is typically later in life. While figures suggest that up to 70% of individuals experience a traumatic event over the course of their lifetime, relatively few go on to develop PTSD (Yehuda et al., 2015).

Etiology

PTSD is unique to the DSM-5 as it is one of only three mental disorders with a contingent etiological cause; that an individual must experience a stressful event or situation in order for PTSD to occur. Many pre-existing factors may increase vulnerability to developing PTSD, including a prior history of psychiatric disorder or trauma (Marks,

Franklin, & Zoellner, 2018) and personality characteristics such as negative emotionality and neuroticism (Jakšic, Brajković, Ivezić, Topić, & Jakovljević, 2012).

Research has suggested that factors which occur during trauma (such as dissociation) are the strongest predictors of future PTSD symptoms (Ozer, Best, Lipsey, & Weiss, 2003). In particular, the way memories are processed during trauma appears strongly linked to the future development of recurrent mental images or flashbacks of the event (Marks et al., 2018). Studies have begun to identify the cognitive mechanisms involved in the processing and interpretation of stressful events that are involved in the genesis of PTSD.

Memory Processing Involved in PTSD

Autobiographical Memories

PTSD has also been closely associated with long-term memory processing (Brewin, 2014), specifically of autobiographical memories (episodic memories that recount events from an individual's life). Autobiographical memories are elaborated memories which contain higher-level material of events, including their personal meaning and details, which are linked to specific points in time (chronology) (Ehlers & Clark, 2000).

Research has implicated two distinct pathways for the processing of memories: a sensory and visuomotor-specific pathway for information such as sounds and images, and a conceptually-based memory pathway for a general understanding and interpretation of the meaning of events.

Perceptual Processing

Perceptual, or data-driven, processing involves the bottom-up interpretation of sensory specific information such as sounds and images. The processed features of a stimulus are limited to form and structure, and often occur implicitly (without conscious awareness). Retrieval of a stimulus via the perceptual pathway involves identification with surface-level

features that do not require extensive understanding or context (Brewin, 2014). In perceptual processing, sensory information is typically visual and normally decays rapidly. In general, little cognitive attention is given to encode this form of information.

A model proposed by Brewin et al. (1996) has suggested that perceptual memory representations form a Situationally Accessible Memory (SAM) storage unit, and can only be accessed automatically through cues associated with the traumatic event. Evidence of perceptual processing is often reflected by tasks involving implicit retrieval, usually through a priming paradigm (Weldon, Roediger, Beitel, & Johnston, 1995) such as a word-stem completion task (Golier, Yehuda, Lupien, & Harvey, 2003). This task presents the start of a previously seen word to participants, and they are asked to complete the word. Perceptual processing is evident if they choose the previously seen word. For example, Lyttle, Dorahy, Hanna, and Huntjens (2010) assessed clinical participants who experienced traumatic events related to the Troubles (i.e. civil conflict) in Northern Ireland. Priming was indicated by successfully retrieving words related to the Troubles, such as paramilitary. Studies have found an association between dissociation and increased perceptual priming (Lyttle et al., 2010; Michael & Ehlers, 2007).

Conceptual Processing

Conceptual processing involves the top-down interpretation of events characterised by deeper understanding, context and, most importantly, meaning to an individual. Higher-order processing is needed to develop sufficient elaboration and interpretation of an event, in order to place it within the context of what it means to the individual and its correct chronology (Conway & Pleydell-Pearce, 2000). It also assists with the integration of the memory with other long-term similar memories. This form of processing uses more controlled and conscious processes, and it may be demonstrated by tasks such as word-cue association (Lyttle et al., 2010). This task presents a word to participants that has similar semantic

meaning to a previously seen word, and participants are asked for an alternative or associated word, with conceptual priming evident if they chose the previously seen word.

Most memory involves the processing and storage of the contextual information of events. Contextually-processed information is necessary for successful integration in the autobiographical memory store. For example, an individual in a conversation is likely to remember the topic of the conversation, and less likely to remember the colour of the lipstick or glasses the other person was wearing (characterised by perceptual processing). Brewin et al. (1996) referred to conceptually processed events as part of the Verbally Accessible Memory (VAM), available upon voluntary recall.

Cognitive Dysfunction Theory of PTSD

One of the key cognitive theories of PTSD is that intrusive memories are caused by dysfunctional memory processing during extreme stress experienced in a traumatic event (Holmes, Brewin, & Hennessy, 2004). This involves a shift in attentive cognitive resources from conceptual information to perceptual information. As a result, there is an increase in largely unconscious perceptual information encoding and a decrease in largely conscious conceptual encoding. With a lack of elaboration of the trauma, the memory is more likely to be represented by perceptual information, and contextual information of the trauma is less likely to be recalled on command after the event. This process is proposed to lead to intrusive thoughts (flashbacks) and may explain why unintentional intrusive memories may be triggered by specific cues associated with a trauma after it has occurred, and why intentional or detailed recall of the trauma may be difficult (Ehlers & Clark, 2000; Kindt, Van den Hout, Arntz, & Drost, 2008).

Processing of Trauma in PTSD Populations

Currently, the reasons why some people develop PTSD following trauma and others do not are not fully understood. Tuval-Mashiach, Freedman, and Shalev (2004) suggested that the period immediately following a trauma is crucial in determining whether an individual will develop PTSD symptoms. Representations of the event that remain restricted to perceptual processing strongly increase the likelihood of developing PTSD symptoms, particularly flashbacks.

While an increased level of perceptual processing may be expected to occur during trauma, continued reliance on remembering the event via the perceptual pathway hinders the ability to properly process the event via the conceptual pathway (Kindt et al., 2008; Buck, Kindt, Van den Hout, Steen, & Linders, 2006). The trauma is most likely to be remembered through 'triggers' from cues that may be perceptually similar to those experienced during the traumatic event (Kleim, Ehring, & Ehlers, 2012). For example, a shade of blue may remind an individual of the colour of the jacket their attacker wore. These perceptual cues can cause an individual to re-experience the event in a very vivid and distressing manner (Hellawell & Brewin, 2004), and the trauma is often re-experienced as though it was happening in the present moment. Reliance on the perceptual representation of trauma, in conjunction with a failure to successfully elaborate, develop meaning, and place the event in the autobiographical memory store, is seen in PTSD populations (Ehlers & Clark, 2000).

A Dutch research group investigated cognitive mechanisms of change during and after treatment for PTSD, and the effect of these cognitive mechanisms of change on PTSD symptoms (Kindt, Buck, Arntz, & Soeter, 2007). Twenty-five trauma victims were treated using a CBT technique which used Imaginal Exposure and Imagery Rescripting tools to correct dysfunctional interpretations of the event. This process introduced new experiences and emotions related to the trauma. Trauma narratives from the patients were gathered before

treatment, after treatment and at one-month follow up to infer levels of perceptual and conceptual processing. These trauma narratives were audio recorded, transcribed and then coded into utterances. These utterances were rated on their type of representation (lower ratings reflected conceptual utterances, higher ratings reflected perceptual utterances). The authors discovered that a change from perceptual processing after treatment to conceptual processing one-month later was related to a decrease in PTSD symptoms. Interestingly, the authors also discovered that a relative increase in perceptual processing during treatment was associated with a relative increase in conceptual processing after treatment. Their overall conclusion suggested that Imagined Exposure in CBT for PTSD may promote later conceptual processing. This finding was consistent with theories of cognitive changes in PTSD which suggest that trauma memories must first be accessible in the SAM (through the perceptual pathway) to be integrated into the VAM (through the conceptual pathway).

Emotional imprints left by trauma appear to be qualitatively different to normal events in how they are remembered (Van der Kolk & Fisler, 1995). When asked to describe their trauma, individuals with chronic PTSD often focus on specific details that comprise sensory information, in contrast to normal populations (i.e. have more perceptual processing). For example, an individual who experienced a car accident may highlight the sound of a car horn before impact, or the exact moment the windscreen shattered and they saw glass sprayed everywhere. Evidence for these sensory representations can be found in studies which have investigated recollections of trauma. Tuval-Mashiach et al. (2004) asked five Jewish survivors of an ambush (they were shot at) to describe their experiences immediately after the attack, one week later and four months later. They discovered that descriptions of the event by survivors directly after the incident were fragmented, broken and lacked chronology (suggesting prominent perceptual processing). After four months, most of the survivors gave a more detailed and context-rich account of the attack and had high levels of positive self-

image (suggesting more conceptual processing). At that time, they were able to attribute their survival to 'miracles' (Hassidic Jews attribute events to miracles) which demonstrated a strong integration of the event with cultural meaning. However, the one individual who went on to develop PTSD had a trauma narrative emphasising perceptual details ("We heard explosions, then we heard the window smashed"). Months later they had failed to develop a positive representation of themselves, the event and its meaning (elaboration via the conceptual pathway).

Peritraumatic studies generally rely on retrospective accounts of trauma which are often inaccurate (Holmes & Bourne, 2008). As trauma is often acute and its cognitive effects immediate, retrospective self-report measures may be an unreliable source of assessing cognitive processing styles. In addition, early studies of peritraumatic processing used correlational research designs, which failed to control for pre-existing or confounding factors such as traumatic brain injury (Holmes & Bourne, 2008). Prospective designs were therefore needed. However, exposing individuals to real-life trauma is beyond the ethical scope of research. Analogue measures of trauma, such as the Trauma Film Paradigm (TFP), have been used as a means to study mechanisms of peritraumatic processing and PTSD symptom development.

The Trauma Film Paradigm (TFP)

Since its use as a measure of physiological stress response during the 1960s, the TFP has been developed as a valid and reliable measure of simulated trauma (Holmes & Bourne, 2008). In the TFP, participants are exposed to a short film depicting distressing content (e.g., car accidents or WWII film clip images) to simulate a trauma-like situation. By controlling the trauma environment, peritraumatic and posttraumatic changes (such as perceptual/conceptual processing or dissociation) can be observed and manipulated, and their effects on PTSD symptoms studied (e.g., frequency and severity of flashbacks). Several

studies have successfully used an audio version of the TFP (TFP-A) to simulate a trauma-like situation (Krans, Näring, Holmes, & Becker, 2010; Dorahy, Peck, & Huntjens, 2016). The inclusion of traumatic factors which can be manipulated in a laboratory setting may improve the accuracy of peritraumatic studies, but lack external validity.

Experimental Studies

Experimental studies have attempted to investigate real-world peritraumatic memory processing through exposure to low-level trauma while manipulating memory processing. Kindt et al. (2008) investigated cognitive processing mechanisms after showing a distressing film (TFP), and the influence of this processing on subsequent flashbacks. For their first experiment, participants were shown a distressing film. They were then instructed to write an essay which focussed only on the physical details of the film, such as colours or facial expressions (perceptual processing group) or an essay which focussed only on the meaning of the film (conceptual processing group). The essays were scored and rated by the authors based on the content of the narratives (largely perceptual or largely conceptual). Flashbacks and avoidance of intrusive thoughts or images after the film were also recorded, as was state dissociation before and after the film. The authors found that the perceptual processing group experienced significantly more intrusions than the conceptual processing group. This result was in line with their predictions; that perceptual processing after trauma increases the risk of developing flashbacks.

In their second study, Halligan et al. (2002) assigned non-clinical participants to either a perceptual processing group or a conceptual processing group during presentation of a distressing film depicting real-life road traffic accidents. The conceptual group was instructed to focus on the meaning and context of the film. The perceptual group was instructed to focus on the images and sounds in the film. PTSD and dissociative symptoms were then measured one week later. Their results showed that the perceptual processing

group experienced more intrusions compared to the conceptual group. However, these groups were pre-selected before the experiment. For example, the perceptual processing group was selected due to their naturally high levels of trait dissociation and anxiety, biasing the study results.

These and other experimental studies have generally shown that by manipulating an increase in the perceptual processing of a traumatic event, the risk of developing PTSD symptoms increases. However, the findings from conceptual processing studies have been mixed. A second experiment by Kindt et al. (2008) investigated peritraumatic memory processing during encoding of a distressing film and subsequent PTSD symptoms. The results from their study were that conceptual processing, relative to perceptual processing and neutral groups, reduced the suppression of intrusions. These participants experienced fewer avoidance symptoms. However, conceptual processing during the encoding of the trauma did not significantly reduce the frequency of intrusions compared to the perceptual processing group. A replication study one year later showed near identical findings (Buck, Kindt, & Van den Hout, 2009).

Another study investigated whether post-trauma elaboration (guided reflection to aid the re-working of memories of the traumatic stimulus) reduced PTSD symptoms. Michael and Ehlers (2007) assigned non-clinical participants to either an experimental condition designed to facilitate elaboration, or a control condition. Increased perceptual processing was first established in both groups by picture stories which depicted distressing content (these were also counterbalanced with neutral pictures). Perceptual processing was measured by a perceptual priming task. Both groups were then shown a distressing film. The results showed that the elaboration group experienced fewer intrusive images of the trauma material compared to the control group.

Currently, there is insufficient evidence to support the role of conceptual processing in PTSD symptomatology.

Interaction of Perceptual and Conceptual Processing in PTSD

It is currently unclear whether the processes involved in the encoding of memory (i.e. perceptual vs. conceptual) are connected (for example, low perceptual, high conceptual, or vice versa) or whether they exist as separate systems. Some conceptualisations suggest an inverse relationship; as one form of processing increases, the other decreases (Buck et al., 2006). However, other theories suggest that perceptual processing may be independent from conceptual processing, as outlined in the dual representation theory of PTSD (Brewin et al., 1996). This theory suggests that PTSD symptoms are caused by either unimpeded encoding of information into the SAM, or information encoded by the VAM is reduced or interrupted. According to the dual representation theory, PTSD may result from the inability to tolerate re-experiencing the event, therefore the trauma is never re-encoded into episodic memory.

Overall, there is insufficient evidence to support one theory over another. However, all accounts agree that under stressful conditions (such as experienced by trauma), perceptual processing tends to function more effectively than conceptual processing (Brewin, 2014). This higher perceptual processing, and reduced conceptual processing may be the result of dissociation during trauma.

Dissociation in PTSD

Defining Dissociation

In its broadest sense, dissociation is a disconnect between two or more mental processes that would otherwise be connected (Cardeña, 1994). According to the American Psychiatric Association (2013), dissociation is defined as the disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment.

Given these multiple domains, the term dissociation is difficult to precisely define (there is no consensus on its definition among studies investigating dissociation and its effects). However, in the context of PTSD, dissociation may indicate altered perceptions of the self (for example, detachment from emotion, personality or memory) or the environment (for example, altered perceptions of time, seeing events as though in a dream) because of trauma. For this review, dissociation is a cognitive process that interferes with the successful integration of material that would normally be filtered through conscious awareness (Olsen & Beck, 2012).

Dissociation was initially viewed as a categorical variable, present only in individuals with mental disorders (particularly hysteria). However, another way to understand dissociation is to conceive it as existing on a continuum (Spitzer, Barnow, Freyberger, & Grabe, 2006). As figure 1 shows, non-pathological forms of dissociation occur frequently.

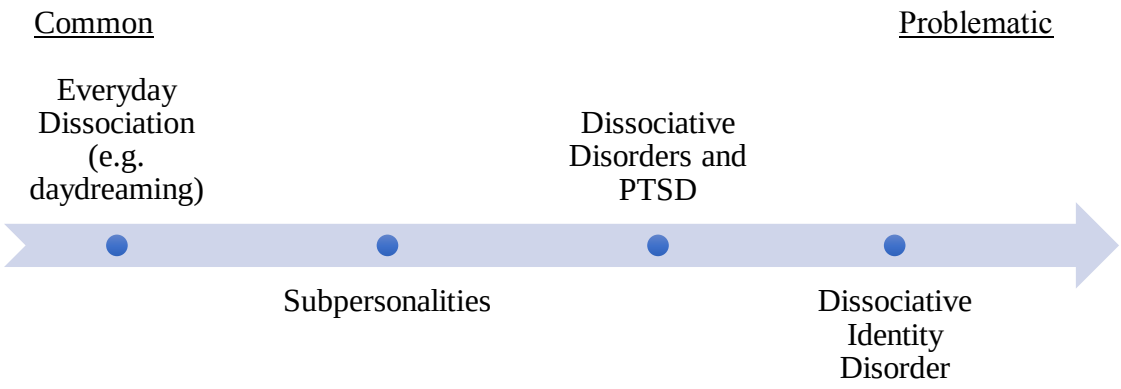

Figure 1. A continuum model of dissociation. Adapted from https://autumnasphodel.com/328/meet-my-alters-part-2.

Mild forms of dissociation such as daydreaming or driving on autopilot (sometimes referred to as 'highway hypnosis') are common in the general population. These are caused by common cognitive failures rather than underlying neurological or psychological deficits. However, extreme forms of pathological dissociation are linked to the core features of the

'dissociative disorders' described in DSM 5, and symptoms found in PTSD. Examples of these include experiencing the self as fragmented (depersonalisation), altered perceptions of reality (derealisation) and lapses in memory of an event or time (dissociative amnesia).

Peritraumatic Dissociation

Peritraumatic dissociation is characterised by dissociative experiences that occur during or immediately after trauma (Van der Hart, Van Ochten, Van Son, Steele, & Lensvelt-Mulders, 2008). Examples of peritraumatic dissociation include altered perceptions of the trauma event (time slowing down), the trauma environment (a lack of environmental awareness, viewing the event through a fog, perceiving the event as unreal) and the self (out-of-body experience, reduction in pain, emotional numbing) (Zoellner & Bittenger, 2004). Peritraumatic experiences are common during trauma (Huntjens, Dorahy, & Van Wees-Cieraad, 2013).

Trait Dissociation

Trait dissociation refers to persistent dissociation or a general tendency to experience dissociative symptoms (Hagenaars & Krans, 2011) and is relatively stable over time.

The Relationship Between Dissociation and PTSD

Dissociation and PTSD

Both peritraumatic and persistent dissociation have been closely associated with PTSD symptom development (McCaslin et al., 2008; Lyttle et al., 2010; Briere, Scott, & Weathers, 2005). Murray, Ehlers, and Mayou (2002) interviewed 27 inpatient and 176 outpatient victims of road traffic accidents on measures of dissociation (peritraumatic dissociation and persistent dissociation four weeks after the accident), pre-accident dissociative tendencies, memory fragmentation, data-driven processing and rumination. The power of these variables to predict PTSD symptoms at four weeks and six months after the

accident was assessed. They found that persistent dissociation was the strongest predictor of chronic PTSD symptoms (6 months after the accident) for both inpatients and outpatients.

A robust meta-analysis by Ozer et al. (2003) investigated seven predictors of PTSD symptoms. This included 16 studies (from 68 studies overall) that looked at the relationship between peritraumatic dissociation and future PTSD symptoms in 3,534 individuals. Peritraumatic dissociation was the best predictor of PTSD symptoms, over and above biological and social factors (although this study did not investigate persistent dissociation).

Whilst there have been some conflicting results, perhaps due to methodological issues within the literature (e.g., misunderstood interpretations of peritraumatic and persistent dissociation, Bedard-Gilligan & Zoellner (2012)), most studies agree that dissociation of some form plays an important role in the development and maintenance of PTSD symptoms (Werner & Griffin, 2012).

Dissociation and Cognitive Processing of Trauma Memories

One of the key mechanisms underlying dissociation and subsequent PTSD development appears to be a failure to correctly encode, retrieve or integrate trauma elements with previous experiences. During trauma, dissociation may prevent normal elements of context, time and elaboration of the event from successfully integrating with the autobiographical memory store. This dissociation may impact on perceptual and conceptual processing.

Huntjens et al. (2013) suggested a combined model of peritraumatic dissociation (initial disruption) and persistent dissociation (maintenance of PTSD symptoms) to explain PTSD development and maintenance. Peritraumatic dissociation may initially provide a shift in attentive resources during trauma (from the processing of largely conceptual information, to the processing of largely perceptual information). This, along with decreased focal

attention during trauma, is thought to disrupt normal conceptual processing, and promote encoding the event via the perceptual pathway (Lyttle et al., 2010). The event is, therefore, largely perceptually-encoded. Persistent dissociation may promote the maintenance of PTSD symptoms by impeding elaboration, meaning and integration of the memory into the autobiographical store (Halligan, Michael, Clark, & Ehlers, 2003). The event is unable to be conceptually processed and this may lead to continued flashbacks of the trauma as well as difficulty voluntarily retrieving it. Overall, dissociation is thought to disrupt memory processes involved with the encoding and retrieval of trauma-related information (Olsen & Beck, 2012).

Experimentally Controlled Dissociation

Attempts to manipulate dissociation in analogue studies have yielded inconclusive results. In a series of studies, Holmes et al. (2004) attempted to artificially induce dissociation to investigate the relationship between memory processing and intrusive memory development. In their first experiment, non-clinical participants were assigned to one of three experimental conditions while watching a trauma film: a visuospatial tapping condition, a dissociation condition (participants watched a small dot designed to induce dissociation on a screen), or a no-task condition. The visuospatial tapping task involved repetitious tapping of a complex five-key pattern on a keypad during the film, and was theorised to use similar cognitive resources as SAM (perceptual memory) encoding. As there was competition for these resources, the concurrent tapping task was predicted to interfere with SAM encoding (heightening conceptual or VAM encoding) and reduce subsequent intrusions. This model was based on the dual-representation theory of memory (Brewin et al., 1996). The primary outcome was the frequency of intrusive memories of the film over one week, as recorded in a diary given to participants. As predicted, the results indicated that the visuospatial tapping group experienced fewer intrusions compared to the other groups. However, contrary to the

author's predictions, the dissociation group did not experience more intrusions compared to the other groups, despite experiencing the highest change in state dissociation. The results did indicate that a spontaneous increase in state dissociation was positively correlated with an increase in intrusions across all conditions, which was replicated in a second and third study by Holmes et al. (2004). The authors concluded that the small dot may have been insufficient to induce dissociation.

According to a review article of the TFP by Holmes and Bourne (2008), no study at the time of writing had successfully manipulated dissociation in an experimental study of PTSD symptom development. A recently updated review article by Marks et al. (2018) reported the same finding. Although one study by Buck et al. (2006) did find a significant relationship between experimentally-induced state dissociation and cognitive intrusions in individuals with spider phobia, their study did not use a TFP.

Overall, the inconclusive findings of these studies may have been due to methodological differences between them. For example, Holmes and Bourne (2008) suggested that attempted manipulations of memory processing (data-driven/perceptual versus conceptual) through verbal instructions may be less valid than manipulations resulting from participant tasks (e.g., assignment to specific conditions with different stimuli). Other methodological shortcomings include the delayed assessment of peritraumatic dissociation, the types of dissociation measures used, and the use of clinical versus non-clinical populations (Dorahy et al., 2016). More research in this area with improved methodology appears required.

Conceptual Priming in PTSD Studies

Studies investigating the link between dissociation and conceptual priming report mixed results. Olsen and Beck (2012) found that individuals with high trait dissociation

scores showed difficulties with encoding and retrieving distressing information (indicating lower conceptual processing) compared to those with low trait dissociation scores. Lyttle et al. (2010) found a decrease in conceptual priming for trauma-related words in a sample with PTSD compared to participants without PTSD. However, no significant correlation between dissociation and conceptual priming was reported. An analogue study conducted by Dorahy et al. (2016) also found no evidence for a link between dissociation and conceptual priming. Currently, few studies have been successful in linking dissociation with a decrease in conceptual priming.

The Present Study

This study aimed to investigate the link between peritraumatic dissociation, memory processing and PTSD symptoms. More specifically, this study aimed to assess whether dissociation could be successfully induced in a laboratory setting. Research has supported the role of peritraumatic dissociation in the development of PTSD symptoms and how these processes are closely connected. However, no studies have successfully manipulated outcome variables by inducing dissociation using an analogue design. This study used a two-session design over a period of three days. Between session one and session two (where the TFP-A was given and recalled), an intrusion diary was given to participants as a measure of cognitive intrusions, similar to previous research designs (Hagenaars & Krans, 2011; Dorahy et al., 2016; Holmes et al., 2004). As recurring mental flashbacks are a core feature of a PTSD diagnosis, these intrusions were measured as a rating of PTSD symptomatology. It was predicted that those who experienced dissociation at encoding would have more intrusions over the course of three days compared to other conditions.

Secondly, this study aimed to further investigate the link between conceptual processing and dissociation. Many theories of dissociation have predicted that impaired conceptual processing increases the risk for PTSD symptoms (Kindt et al., 2008). However, few studies

have successfully demonstrated this relationship using an analogue study design. To test this theory, participants were randomly assigned to one of three conditions for their first session: a dissociation condition (observing a spinning dot), a neutral condition (observing neutral pictures) or a control condition. Participants were exposed to one of these three conditions while listening to simulated traumatic material (i.e. auditory TFP). Participants returned two days later and were instructed to recall the trauma information in as much detail as they could remember. During this task, participants were again assigned to the dissociation condition, the neutral picture condition or the control condition. Those who were placed in the dissociation condition at both encoding and retrieval phases were predicted to have impaired conceptual processing for the traumatic event (TFP-A). Therefore, individuals placed in this group were predicted to have a recall of the trauma which was less conceptually-based than the other conditions.

In addition, a conceptual priming task was incorporated as another measure of conceptual processing. A word-cue association task was used (similar to the task used by Lyttle et al., (2010)) to test for semantically-processed words during the encoding phase of the experiment. Three separate groupings of words were presented; Target-Threat words (threatening words included in the TFP-A, e.g., *Torture*), Target-Neutral words (non-threatening words included in the TFP-A, e.g., *Desert*) and Non-Target Threat words (threatening words not included in the TFP-A, e.g., *Killing*). Conceptual processing was demonstrated by successfully retrieving previously-encoded words. In line with the hypothesis of a study by Lyttle et al. (2010), participants who experienced dissociation at encoding were predicted to show impaired conceptual processing for target-threat words compared to non-dissociation groups.

Method

Research Design

The overall design was a 3 (memory process: baseline, encoding, retrieval) x 3 (condition: picture, spiral, sit quietly) mixed design. The memory process independent variable was repeated measures and the condition independent variable was between subjects. The dependent variables included dissociation (state and trait), level of conceptual priming, invasive memories (frequency and severity), depression, anxiety and the retrieval characteristics of information (e.g., conceptual representation).

Participants

Participants were University students from the Christchurch region of New Zealand. There were 179 participants (61 males, 117 females, 1 identified as other) aged from 17 to 54 (M = 22.13, SD = 6.13). Thirteen participants were excluded due to being below age 18 (N = 1), not being enrolled as a University student (N = 2), failing validity questions (N = 4), not returning for the second session (N = 5) or experiencing a computer glitch during the study (N = 1). The final sample for analysis comprised 166 participants (57 males, 108 females, 1 identified as other) with a mean age of 22.05 (SD = 5.80). Those excluded did not differ from those included on gender, χ^2 (2, N = 179) = .16, p = .93, age, F(1, 177) = .39, p = .54, η_p^2 = .00, trauma type (interpersonal or non-interpersonal), χ^2 (1, N = 61) = .04, p = .85, time since trauma, χ^2 (3, N = 62) = 4.08, p = .25, or whether participants still thought about their trauma, χ^2 (1, N = 62) = .07, p = .79. However, those excluded from the analysis experienced more trauma than those included, χ^2 (1, N = 179) = 4.48, p = .03. Ethnicity and education were not subjected to analyses due to low cell counts in some cells.

One hundred and six participants were recruited via a student participant pool and were given 3 course credits for completing the study. The remaining sixty participants were

volunteer University students recruited through posters (see Appendix J) and emails around University. They were given a $5 coffee voucher upon completion of the first session, and a $10 shopping voucher upon completion of the second session of the study. Inclusion criteria were over the age of 18, having an acceptable grasp of both written and spoken English, having normal or adjusted to normal vision and hearing, and providing written informed consent prior to commencing the study (see Appendix D).

Participant Assignment

Participants were randomly assigned (sequentially) to one of five experimental conditions at the start of their first sessions. Their condition determined what visual stimuli they received at baseline, encoding and retrieval. At baseline they saw either (1) a spinning dot (dissociation task), (2) a set of moving pictures (picture task) or (3) no visual stimuli. Those who received the dissociation task at baseline received the picture task during the encoding phase of the study. Those who received the picture task at baseline received the dissociation task at encoding. This design minimised practice (or familiarity) effects from baseline to the next (encoding) phase of the study. Thus, the groups were: (1) Dissociation at Encoding/Dissociation at Retrieval (DEDR), (2) Dissociation at Encoding/Picture (non-dissociation) at Retrieval (DEPR), (3) Picture at Encoding/Dissociation at Retrieval (PEDR), (4) Picture at Encoding/Picture at Retrieval (PEPR) and (5) Listening (without visual stimuli) at Encoding/Listening at Retrieval (LELR). The listening condition also received the listening task at baseline (i.e., a true control condition with listening only at all three assessment points; baseline, encoding, retrieval). See Appendix B for a visual representation.

Materials

Trauma-Film Paradigm Audio Recording (TFP-A)

Participants listened to a potentially distressing narrative of a journalist being kidnapped, tortured, and eventually executed by terrorists. The narrative was based on the true events of a reporter, which was published in The New York Times in the article *The Horror Before the Beheadings* (Callimachi, 2014). The story was pieced together from events reported by other hostages who were ultimately freed. The narrative for this study was shortened to a recorded piece that lasted just over 8 minutes in length, which drew from the published case the events which occurred in a chronically-organised manner. The storyline depicted the reporter's initial kidnapping, subsequent torture experiences and execution. Participants listened to the narrative through headphones.

Condition Independent Variable

Spinning-Dot Task (Experimental Condition/Dissociation Task)

This study used a modified version of the spinning dot task which had been successfully shown to induce dissociation (e.g., Dorahy et al., 2016). A dot was presented in the middle of a series of rotating circles on a computer screen, which gave the illusion the circles were 'spinning' around the dot. Throughout this task, red crosses appeared randomly in the middle of the screen. When a red cross appeared, participants were instructed to press a button on a *Chronos* box (Psychology Software Tools, Pittsburgh, PA, 2019) to ensure engagement in the exercise (see Figure 2 for an approximate visual representation).

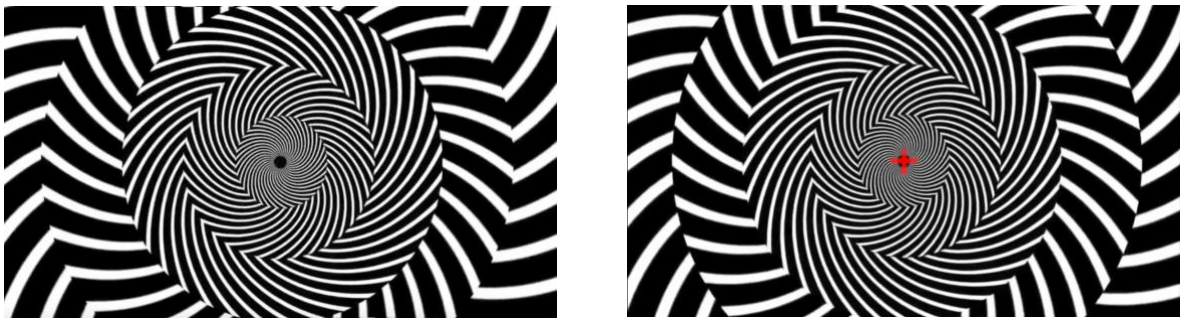

Figure 2. An approximate visual representation of the spinning-dot visual stimuli. Note: Left shows spinning dot without cross, right with cross.

Pictures Task (Control Condition/Picture Task)

Pictures were selected from the International Affective Picture System (IAPS) with valence ratings of pleasure between 4.00 and 6.99 to ensure neutral affect. Pictures appeared in random order and in random locations on screen for three seconds before changing. During the task, a red cross appeared in the middle of the screen. When a red cross appeared, participants were instructed to press a button on a *Chronos* box to ensure engagement in the exercise. This pictures task was designed to keep attention shifting to active stimuli to reduce the likelihood of dissociative experiences like trance states, daydreams, depersonalisation and derealisation.

No Stimuli (Control Condition/No Visual Stimuli Task)

In the control condition participants were not presented with any visual stimuli. Instead, they listened to the TFP-A in front of a blank computer screen.

Instructions

Each participant was presented with a list of instructions detailing their task during baseline, encoding and retrieval. Prior to the baseline task, participants were instructed to watch the visual stimuli on the screen (spiral and picture conditions) and press the button indicated to them on the *Chronos* box when a red cross appeared. The control condition was instructed to sit quietly. During the encoding phase, all participants were told their memory

would be tested, and to concentrate on the story while performing their indicated task (staring at the spinning dot, staring at pictures or listening quietly). During the retrieval phase, all participants were asked to recall their memory of the story in as much detail as they could remember while performing their indicated task (staring at the spinning dot, staring at pictures or recalling as normal). These instructions are detailed in Appendix E.

Intrusion Diary

Participants were issued with an intrusion diary (see Appendix H), with detailed instructions on how to complete it, at the end of the first session. They were instructed to recall any spontaneous thoughts of the trauma narrative in this diary. The diary was split into three days with each day sectioned into morning, afternoon, evening and night. Each time-period had a column for a full detailed description of the intrusion, including its type (audio, visual, audio/visual), the emotion it activated and distress it caused (rated on a ten-point Likert scale). On an eleven-point Likert scale from 0 (never remembered to write down the thoughts/memories/feelings) to 10 (always remembered to write down the thoughts/memories/feelings), participants rated their compliance with diligently recording of their intrusive memories.

Questionnaires

The *Demographic Questionnaire* collected data on gender, age, ethnicity, highest level of educational achievement, and whether the participant had been involved in a traumatic incident. If participants endorsed prior trauma (yes/no), they were also asked to briefly describe the event, and how long ago the event occurred. They were also asked how often they thought about the trauma on a six-point Likert scale; Never (0) to Multiple Times a Day (6), and on an eleven-point Likert scale how much distress it caused them when they thought about it; Totally Relaxed/No Emotion (0) to Highest Emotion They Had Ever Felt (10). All participants were asked whether they had ever been diagnosed with a mental

disorder (yes/no). If so, they were asked to give details of the disorder. All participants were also asked whether they had been told they had difficulty remembering things, whether they had trouble with their hearing or vision and whether these had been corrected (yes/no). On a yes/no dichotomous scale, they were also asked whether they had ever lost consciousness from a head injury (if so, for how long).

The Dissociative Experiences Scale –II (DES-II; Carlson & Putnam, 1993) used a 28 self-report item index to assess trait dissociative experiences. It contained a subset of 8-items designed to detect pathological dissociation (DES-Taxon; Carlson & Putnam, 1993). Answers ranged from Never (0% of the time) to Always (100% of the time). The DES has shown good reliability and validity as a measure of trait dissociation (Van IJendoorn & Schuengel, 1996). Internal reliability for the current study was strong (a = .92).

The Depression, Anxiety, Stress Scale (DASS; Lovibond & Lovibond, 1995) is a 21-item measure of feelings of depression, anxiety and stress over the previous week. Each question is assessed using a four-point Likert scale ranging from Did Not Apply to Me (0) to Applied to Me Very Much, or Most of the Time (3). The DASS has shown good internal reliability (a = .88) (Tran, Tran, & Fisher, 2013). Internal reliability for the current study was strong (a = .86).

The State-Trait Anxiety Inventory-6 (STAI-6; Marteau & Bekker, 1992) is a 6-item index of state anxiety based on the Spielberger State Trait Anxiety Inventory (STAI). Each question was assessed using a four-point Likert scale to assess how the participant was feeling at that specific moment. Questions with positive wording were reverse-coded to reflect higher anxiety in higher scores. Answers ranged from Not at All (1) to Very Much (4). The STAI-6 was administered at baseline and at encoding with good internal reliability for the current study (a = .77 at baseline, a = .86 at encoding).

The Modified Peritraumatic Dissociative Experiences Questionnaire (MPDEQ; Marshall, Orlando, Jaycox, Foy, & Belzberg, 2002) is a 9-item index designed to measure peritraumatic dissociation at baseline, encoding, and retrieval stages of the experiment. The MPDEQ is an adaptation of the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar, Weiss, & Metzler, 1997), with an extra question added to assess emotional numbing. Each question is assessed on a five-point Likert scale ranging from Not at All True (1) to Very Much True (5). The MPDEQ has shown good internal reliability and validity (Marshall et al., 2002). Reliability for the current study was relatively strong at baseline (a = .78), at encoding (a = .77) and was strong at retrieval (a = .80).

Validity Questions were included six times in the first session of the experiment and ten times during session two. The questions were designed to ensure correct focus, engagement and understanding of the tasks. The validity questions for Session One read; *If you are reading this please select 100% (eleventh across)* (placed in the DES scale); *If you are reading this question select Number 3* (placed in the DASS scale); *What stimuli were you just shown on the computer screen? How much were you able to fully focus or attend to the spinning dot and red crosses/pictures and red crosses/narrative? How anxious were you whilst listening to the narrative?* And finally, *How well do you remember the story?* The validity questions for Session Two read; *How clear and organised do you feel your memory is of what you heard three days ago? How well do you remember the story? Since I listened to the story, I have thought about its content (i.e., rehearsed recalling the narrative)*; *Since I listened to the story, I have talked about its content to others*; *If you are reading this, please select 'Very Much True'* (placed in the MPDEQ recall); *What stimuli were you just shown on the computer screen? How much were you able to fully focus or attend to the spinning dot and red crosses/pictures and red crosses/ recalling the narrative? How anxious were you*

whilst recalling the narrative? How much did you understand the narrative? And finally, *How disorganised and/or jumbled do you believe your recollection was?*

Conceptual Priming Task

A word-cue association task was used to assess conceptual priming for previously encoded words. A cue word was shown on the computer screen and participants were instructed to answer with the first *associated* word that came to mind by speaking into a recording microphone. After an answer was submitted, a cross appeared in the middle of the screen for 2 seconds, followed by the next word-cue. For example, participants could be presented with the cue word *'Rocket'*. Possible associated answers could include *'Blast'*, or *'Space'*. Conceptual priming is argued to be demonstrated by answering the cue words with previously encoded words, which appeared in the narrative, more frequently than other words. Successful retrieval of encoded words is assisted by conceptual priming. The conceptual task used three groups of randomised word lists: target-threat, non-target threat, and target-neutral. Each cue word contained a possible associated word that could be either the target (i.e., word in narrative) or another word (not in the narrative) matched by frequency in the English language (40 per million) (Corpus of Contemporary American English (COCA), 2008). The target and matched words had an average association of 4.4 (between the 3rd and 7th association) with the cue word taken from the Edinburgh Associative Thesaurus (2013). Thus, none of the associated words were the most common associative for the target word. For example, the cue *Sand* had as it most common associate word, *Grains*. But in this study the target word *Desert* was the third most common associated word, and its matched word, *Beach*, was the second most common associated word to that cue. Each participant was given two practice words, followed by feedback on their performance, before beginning the main trials. This task was modelled on a similar design used by Lyttle et al. (2010).

Trauma Film Paradigm Narrative Coding Schedule

To be able to use the narrative data that participants recalled in the retrieval phase of the study, a perceptual/conceptual scale was used to code the data so they could be compared across conditions. This was to determine if dissociation at encoding or at retrieval impacted on the nature of the memory which represented the narrative.

Perceptual and Conceptual Coding

Each narrative transcript (i.e. from the retrieval phase of the study) was coded into utterances (clauses which contained only one thought, action, or speech utterance; e.g. He was taken in a taxi). Memory representations of the narrative were coded using a nine-point Likert scale (Buck et al., 2006; Kindt et al., 2007) to assess conceptual and perceptual memory processing, from 1 (exclusively conceptual representations and/or contextualisations) to 9 (exclusively perceptual representations). Utterances were given a number based on the ratio of conceptual to perceptual details. For example, the utterance *They took him to an abandoned warehouse* is given a score of 8 (*They took him to an* = 5 perceptual details, *abandoned warehouse* = 2 contextual details). Scores were averaged together to create an overall score for the participant. Perceptual representations might have included descriptions of people or places. Conceptual representations might have included explanations of why events occurred. Contextual details referenced location, date or time. The transcripts were coded by two independent raters. The intraclass correlation coefficient was .46 for 50 transcripts.

Procedure

For each participant, this study took place in two sessions over three days in a laboratory room in the Psychology Department at the University of Canterbury.

Session One/Day One (Encoding): Participants arrived at the laboratory and completed the information and written consent process. Participants were then given a unique

identification code to determine which of the five experimental conditions they would be randomly allocated (see Appendix B). Participants were sequentially allocated across conditions and were unaware of their condition until the experiment had been completed. The researcher was required to be aware of their condition throughout the experiment.

A list of instructions appeared on the computer screen, before participants completed a baseline task for three minutes. This was the task they were not exposed to during encoding (i.e., DEDR and DEPR conditions were given a picture task, PEDR and PEPR conditions were given a dissociation task). This was to counteract potential practice effects. Those in the LELR condition were instructed to sit quietly during this time. Participants then completed the demographic questionnaire, DES-II, DASS, and baseline MPDEQ and STAI-6 on the computer using Qualtrics software.

Before completing the encoding task, participants observed for ten seconds on the screen a picture of the man in the story, followed by twenty seconds of the visual stimuli they would be exposed to during the encoding phase, without the narrative (i.e, TFP-A) playing. This allowed participants to become accustomed to the visual stimuli before the audio began. Following this, participants undertook encoding of the TFP-A. All participants listened to the narrative while engaged in (1) the dissociation task (looking at the spinning dot), (2) the neutral task (looking at neutral pictures) or (3) the listening task (listening to narrative without visual stimuli). After the narrative had finished, participants completed MPDEQ, STAI-6 and validity questionnaires regarding their experience of the TFP-A. Participants then completed the word-cue association task. Participants were issued with an intrusion diary which was explained in full by the researcher. At the end of the session, an incentive for participating was given (i.e., course credit or a $5 coffee voucher).

Session Two/Day Three (Retrieval): Participants returned to the laboratory where they were debriefed on their intrusion diary. Validity questions were then completed (using

Qualtrics software) to assess clarity and thought patterns about the story, which tested their metacognitive memory of the TFP-A narrative.

Before completing the retrieval task, participants observed a picture of the man in the story displayed on the screen for ten seconds, followed by twenty seconds of the visual stimuli they were to be exposed to during the retrieval phase. This allowed participants to become accustomed to the visual stimuli before recounting what they remembered. Participants were then given 8.2 minutes (the length of the original narrative) to recall as much of the narrative as they could whilst completing one of the assigned condition tasks (i.e., dissociative task, picture task, no visual task). Their narrative recollection was audio recorded for later coding. When participants reported that they had remembered everything, they were prompted to remember any additional information. If a silence of 40 seconds occurred, the recording of their recall was stopped. After the retrieval section had finished, participants completed MPDEQ, STAI-6 and validity questionnaires regarding their experience during their recall of the TFP-A narrative. Participants were then fully debriefed on the experiment and given a list of support services should they need them. At the end of the session either course credit or a $10 shopping voucher was offered for participation. The study was approved by the University of Canterbury Human Ethics Committee (HEC 2018/12) (See Appendix A).

Data Analysis

Data from the study was analysed using SPSS (25). For the demographic information, chi-square analyses were conducted to analyse categorical variables (gender, ethnicity, education, trauma variables and health variables) while a one-way analysis of variance was used to analyse age. A one-way analysis of variance was used to analyse DES (and DES taxon) and DASS questionnaires, while a repeated measures analysis of variance was used to analyse the STAI and MPDEQ questionnaires. The primary outcomes were conducted using

various analyses. A one-way analysis of variance was used to analyse the perceptual/conceptual recall scores, while a mixed analysis of variance was used to analyse the word-cue association task and the intrusion diaries.

Results

Manipulation Check

A one-way analysis of variance to examine if the dissociation manipulation was effective showed no difference between groups for baseline levels of dissociation, $F(2, 163) = .17$, $p = .84$, $\eta_p^2 = .00$ (see Table 1). However, a one-way ANOVA detected differences in state anxiety at baseline, $F(2, 163) = 3.45$, $p = .03$, $\eta_p^2 = .04$. Gabriel's test indicated higher levels of baseline anxiety in the spiral group compared to the picture group ($p = .04$). There were no significant differences in baseline levels of anxiety between the control and picture group ($p = .97$) or between the control and spiral group ($p = .27$; Table 1).

No significant differences were found between groups for encoding levels of dissociation, $F(2, 163) = 2.48$, $p = .09$, $\eta_p^2 = .03$, or anxiety, $F(2, 163) = .64$, $p = .53$, $\eta_p^2 = .01$ (see Table 1).

In addition, no significant differences were found between groups for retrieval levels of dissociation, $F(2, 163) = .30$, $p = .74$, $\eta_p^2 = .00$, or anxiety, $F(2, 163) = .22$, $p = .80$, $\eta_p^2 = .00$ (see Table 1).

Table 1.
Descriptive Statistics Showing the Mean (M) and Standard Deviation (SD) Across Groups for Peri-Experimental Levels of Dissociation and Anxiety.

	Control *M* (*SD*)	Picture *M* (*SD*)	Spiral *M* (*SD*)	Total *M* (*SD*)
Base. MPDEQ	19.93 (6.10)	19.66 (6.29)	20.31 (6.77)	19.98 (6.42)
Base. STAI	10.03 (9.79)	9.79 (2.35)	11.07 (3.35)	10.36 (2.98)
Enc. MPDEQ	19.30 (5.83)	19.38 (6.38)	21.53 (6.14)	20.25 (6.24)
Enc. STAI	15.10 (4.30)	15.21 (4.13)	14.43 (4.26)	14.87 (4.21)
Rec. MPDEQ	19.37 (5.44)	19.59 (6.35)	20.29 (6.80)	19.84 (6.37)
Rec. STAI	12.07 (3.61)	12.17 (3.54)	12.51 (3.79)	12.30 (3.64)

Note: Baseline Dissociation (Base. MPDEQ); Baseline Anxiety (Base. STAI); Encoding Dissociation (Enc. MPDEQ); Encoding Anxiety (Enc. STAI); Recall Dissociation (Rec. MPDEQ); Recall Anxiety (Rec. STAI).

Given the manipulation of dissociation did not appear to induce dissociation, a median split on peri-experimental dissociation scores at encoding (median = 20.5) and retrieval (median = 19) was performed to create four new groups for further analyses, identified by levels of low and high dissociation scores (i.e. Low encoding [LE], Low retrieval [LR]; High encoding [HE], High retrieval [HR]). The low dissociation group at encoding had a mean MPDEQ of 15.21 (*SD* = 3.30), while participants in the high encoding group had a mean score of 25.28 (*SD* = 4.03). For retrieval dissociation, the mean MPDEQ score for the low group was 17.43 (*SD* = 5.94), while the score for the high group was 22.25 (*SD* = 5.88).

Demographics

Chi-squared analysis for demographic information showed no difference between the four groups on gender, $\chi^2(6, N = 166) = 7.07$, $p = .32$. Ethnicity and education were not subjected to analyses due to low counts in some cells (see Table 2).

A one-way ANOVA for age showed a marginally non-significant difference between groups, $F(3, 162) = 2.65$, $p = .05$, $\eta_p^2 = .05$ (see Table 2).

Table 2.
Descriptive Statistics Showing the Number (n) and Total Percentage (%) of the Demographic Information Across Groups for Gender, Age, Ethnicity and Education.

		LELR *N/M (%/SD)*	LEHR *N/M (%/SD)*	HELR *N/M (%/SD)*	HEHR *N/M (%/SD)*	Total *N/M (%/SD)*
Sample		52 (31.3)	31 (18.7)	22 (13.3)	61 (36.7)	166 (100)
Gender	Male	19 (11.4)	15 (9.0)	5 (3.0)	18 (10.8)	57 (34.3)
	Female	32 (19.3)	16 (9.6)	17 (10.2)	43 (25.9)	108 (65.1)
	Other	1 (0.6)	0 (0)	0 (0)	0 (0)	1 (0.6)
Age		23.69 (6.92)	22.42 (5.30)	20.55 (3.63)	21.02 (5.38)	22.05 (5.80)
Ethnicity	NZ					
	European	31 (18.7)	17 (10.2)	15 (9.0)	46 (27.7)	109 (65.7)
	Maori	7 (4.2)	4 (2.4)	0 (0)	1 (0.6)	12 (7.2)
	Samoan	0 (0)	0 (0)	0 (0)	1 (0.6)	1 (0.6)
	Niuean	1 (0.6)	0 (0)	0 (0)	0 (0)	1 (0.6)
	Chinese	0 (0)	2 (1.2)	2 (1.2)	3 (1.8)	7 (4.2)
	Indian	2 (1.2)	1 (0.6)	1 (0.6)	3 (1.8)	7 (4.2)
	Other	11 (6.6)	7 (4.2)	4 (2.4)	7 (4.2)	29 (17.5)
Education	Undergrad	47 (28.3)	29 (17.5)	21 (12.7)	55 (33.1)	152 (91.6)
	Postgrad	3 (1.8)	2 (1.2)	1 (0.6)	4 (2.4)	10 (6.0)
	Other	2 (1.2)	0 (0)	0 (0)	2 (1.2)	4 (2.4)

Fifty-four participants had experienced a traumatic incident. Fifteen (28.3%) had experienced interpersonal trauma and 38 (71.7%) had experienced non-interpersonal trauma (see Table 3). One participant did not state what type of trauma they had experienced. Chi-squared analysis showed no significant difference between the dissociation groups for experiences of trauma, χ^2 (3, N = 166) = .65, p = .88, type of trauma (interpersonal or non-interpersonal), χ^2 (3, N = 53) = 1.91, p = .59, time since traumatic incident, χ^2 (9, N = 54) = 8.11, p = .52 or whether participants still thought about the trauma, χ^2 (3, N = 54) = .79, p = .85 (see Table 3).

Table 3.
Descriptive Statistics Showing the Number (n) and Percentage (%) Across Groups for Trauma-Related Information.

		LELR *n* (%)	LEHR *n* (%)	HELR *n* (%)	HEHR *n* (%)	Total *n* (%)
Trauma	Yes	18 (10.8)	9 (5.4)	6 (3.6)	21 (12.7)	54 (32.5)
	No	34 (20.5)	22 (13.3)	16 (9.6)	40 (24.1)	112 (67.5)
Trauma Type*	IP	7 (38.9)	2 (22.2)	2 (33.3)	4 (20.0)	15 (28.3)
	NI	11 (61.1)	7 (77.8)	4 (66.7)	16 (80.0)	38 (71.7)
Elapsed Time*	<12 months	4 (22.2)	1 (10.0)	0 (0)	3 (15.0)	8 (14.8)
	1-5 years	9 (50.0)	4 (40.0)	6 (100)	11 (55.0)	30 (55.6)
	6-10 years	3 (16.7)	2 (20.0)	0 (0)	3 (15.0)	8 (14.8)
	11+ years	2 (11.1)	3 (30.0)	0 (0)	3 (15.0)	8 (14.8)
Still think*	Yes	14 (77.8)	7 (70.0)	4 (66.7)	13 (65.0)	16 (70.4)
	No	4 (22.2)	3 (30.0)	2 (33.3)	7 (35.0)	16 (29.6)

Note: Interpersonal Trauma (IP); Non-Interpersonal Trauma (NI); Still Think About the Trauma (Still think). *Indicates % Within the Participants in Group, Not of Total Participants.

Chi-squared analyses showed no significant difference between dissociation groups for having a mental health diagnosis, χ^2 (3, N =166) =3.31, p =.35, memory problem, χ^2 (3, N = 166) = 1.75, p = .63, hearing problem, χ^2 (3, N = 166) = 2.27, p = .52, vision problem, χ^2 (3, N = 166) = 2.76, p = .43 or ever having loss of consciousness for more than 30 minutes, χ^2 (3, N = 166) = 2.17, p = .54 (see Table 4).

Table 4.
Descriptive Statistics Showing the Number (n) and Percentage (%) Across Groups for Mental Health and Other Health Concerns.

		LELR *n* (%)	LEHR *n* (%)	HELR *n* (%)	HEHR *n* (%)	Total *n* (%)
MH Dx	Yes	15 (9.0)	4 (2.4)	4 (2.4)	12 (7.2)	35 (21.1)
	No	37 (22.3)	27 (16.3)	18 (10.8)	49 (29.5)	131 (78.9)
Dx*	Dep.	8 (53.3)	2 (50.0)	2 (50.0)	1 (8.3)	13 (37.1)
	Anx.	0 (0)	0 (0)	0 (0)	1 (8.3)	1 (2.9)
	Dep. & Anx.	5 (33.3)	1 (25.0)	1 (25.0)	5 (41.7)	12 (34.3)
	PTSD	1 (6.7)	1 (25.0)	1 (25.0)	0 (0)	3 (8.6)
	OCD	0 (0)	0 (0)	0 (0)	1 (8.3)	1 (2.9)
	Tourette's	0 (0)	0 (0)	0 (0)	1 (8.3)	1 (2.9)
	Multiple (3+)	0 (0)	0 (0)	0 (0)	3 (25.0)	3 (8.6)
	Not Specified	1 (6.7)	0 (0)	0 (0)	0 (0)	1 (2.9)
Memory Problem	Yes	49 (29.5)	27 (16.3)	21 (12.7)	56 (33.7)	153 (92.2)
	No	3 (1.8)	4 (2.4)	1 (0.6)	5 (3.0)	13 (7.8)
Hearing Problem	Yes	51 (30.7)	29 (17.5)	22 (13.3)	58 (34.9)	160 (96.4)
	No	1 (0.6)	2 (1.2)	0 (0)	3 (1.8)	6 (3.6)
Vision Problem	Yes	46 (27.7)	25 (15.1)	21 (12.7)	54 (32.5)	146 (88.0)
	No	6 (3.6)	6 (3.6)	1 (0.6)	7 (4.2)	20 (12.0)
LC	Yes	1 (0.6)	2 (1.2)	0 (0)	2 (1.2)	5 (3.0)
	No	51 (30.7)	29 (17.5)	22 (13.3)	59 (35.5)	161 (97.0)

Note: Mental Health Diagnosis (MH Dx); Diagnosis (Dx); Depression (Dep.); Anxiety (Anx.); Posttraumatic Stress Disorder (PTSD); Obsessive-Compulsive Disorder (OCD); Multiple Diagnoses (Multiple); Lost Consciousness (LC). * Indicates % Within the Participants in Group, Not of Total Participants.

DES Total

A one-way analysis of variance showed a main effect of level of dissociation on overall DES scores, $F(3, 162) = 11.86$, $p < .001$, $\eta_p^2 = .18$ (see Table 5). Gabriel's test indicated significantly higher levels of dissociation in the LEHR group compared to the LELR group ($p < .001$) and significantly higher levels of trait dissociation in the HEHR group compared to the LELR group ($p < .001$). Seemingly, those with higher trait dissociation generally experienced more dissociation during the tasks.

DASS Scores

A one-way analysis of variance failed to show a main effect for level of dissociation on DASS depressive subscale items, $F(3, 162) = 2.09$, $p = .10$, $\eta_p^2 = .04$. A similar result was present for DASS anxiety, $F(3, 162) = 2.12$, $p = .10$, $\eta_p^2 = .04$, and DASS stress, $F(3, 162) = 2.12$, $p = .10$, $\eta_p^2 = .04$ (see Table 5).

STAI –State Anxiety

A 3 (time; baseline, encoding, retrieval) by 4 (group: LELR; LEHR; HELR; HEHR) mixed ANOVA on state anxiety scores produced a main effect for time (baseline, encoding and retrieval), $F(2, 324) = 96.05$, $p < .001$, $\eta_p^2 = .37$ (see Table 5). Pairwise comparisons indicated significantly higher STAI scores at encoding compared to baseline ($p < .001$) and recall ($p < .001$). STAI scores were also significantly higher at recall than baseline ($p < .001$). No significant group main effect was found, $F(3, 1621) = 1.71$, $p = .17$, $\eta_p^2 = .03$, nor was the interaction between time and group significant, $F(6, 324) = .92$, $p = .48$, $\eta_p^2 = .02$ (see Table 5).

Table 5.
Descriptive Statistics Showing the Mean (M) and Standard Deviation (SD) Across Groups for Questionnaires.

		LELR *M* (SD)	LEHR *M* (SD)	HELR *M* (SD)	HEHR *M* (SD)	Total *M* (SD)
DES Total		13.67 (9.33)	26.60 (14.25)	21.17 (14.59)	27.15 (14.06)	22.03 (14.09)
DES Taxon		6.61 (7.08)	14.92 (11.32)	11.19 (12.73)	18.38 (15.11)	13.09 (12.93)
DASS Dep.		7.27 (6.31)	10.39 (9.72)	7.36 (4.80)	10.23 (8.28)	8.95 (7.72)
DASS Anx.		11.0 (6.55)	14.45 (9.13)	14.36 (6.58)	13.90 (7.73)	13.16 (7.61)
DASS Stress		5.50 (3.27)	7.23 (4.57)	7.18 (3.29)	6.95 (3.87)	6.58 (3.80)
STAI	Baseline	10.15 (3.19)	10.26 (3.07)	10.18 (2.59)	10.66 (2.93)	10.36 (2.98)
	Encoding	13.77 (4.23)	14.74 (4.48)	15.68 (3.76)	15.57 (4.09)	14.87 (4.21)
	Retrieval	11.63 (3.55)	12.39 (3.55)	12.0 (3.30)	12.92 (3.86)	12.30 (3.64)

Note: DASS Depression Subscale Items (DASS Dep.); DASS Anxiety Subscale Items (DASS Anx.).

Perceptual/Conceptual Recall Scores

A one-way between subjects ANOVA failed to indicate a main effect of level of dissociation on perceptual/conceptual rating scores, $F(3, 162) = .33$, $p = .81$, $\eta_p^2 = .01$ (see Table 6). The average score from rater one was 7.70 (*SD* = .53) while the average score from rater two was 8.30 (*SD* = .44) (taken from 50 transcripts).

Table 6.
Descriptive Statistics Showing the Mean (M) and Standard Deviation (SD) Across Groups for Perceptual/Conceptual Task Recall Scores.

	LELR *M* (SD)	LEHR *M* (SD)	HELR *M* (SD)	HEHR *M* (SD)	Total *M* (SD)
Perc/Conc	7.66 (.50)	7.73 (.57)	7.66 (.54)	7.75 (.53)	7.71 (.53)

Note: Perceptual/Conceptual Rating Scores (Perc/Conc).

Word-Cue Association Task

A mixed ANOVA for conceptual priming on dissociation at encoding (low or high) by word type (target threat, non-target threat and target neutral) failed to produce a main effect for dissociation, $F(1,164) = .36$, $p = .55$, $\eta_p^2 = .00$. However, the main effect for word type was significant, $F(2, 163) = 113.38$, $p < .001$, $\eta_p^2 = .58$, with more conceptual priming for target threat words than non-target threat ($p < .001$) or target neutral words ($p < .001$). There was no significant interaction between group and word type, $F(2, 163) = 2.52$, $p = .08$, $\eta_p^2 = .03$ (see Table 7).

Intrusion Diaries

A mixed ANOVA for frequency of intrusions on dissociation at encoding (low or high) by day (day one, two and three) failed to produce a main effect for dissociation, $F(1, 157) = 1.11$, $p = .29$, $\eta_p^2 = .01$. However, the main effect for day was significant, $F(2,156) = 63.89$, $p < .001$, $\eta_p^2 = .45$, with more intrusions on day one than day three ($p < .001$) and day two than day three ($p < .001$), but no differences were present between day one and day two ($p = .33$). There was no significant interaction between group and day, $F(2,156) = .39$, $p = .67$, $\eta_p^2 = .015$ (see Table 7).

A mixed ANOVA for distress of intrusions on dissociation at encoding by day produced a main effect for dissociation, $F(1, 42) = 4.94$, $p = .03$, $\eta_p^2 = .11$. However, no significant differences were present for day, $F(2, 41) = .11$, $p = .90$, $\eta_p^2 = .01$, nor was there a significant interaction between group and day, $F(2, 41) = .57$, $p = .57$, $\eta_p^2 = .03$ (see Table 7).

Table 7.
Descriptive Statistics Showing the Mean (M) and Standard Deviation (SD) for Level of Dissociation at Encoding for the Word Cue Association Task and Intrusion Diaries.

		Low Diss. *M* (*SD*)	High Diss. *M* (*SD*)	Total *M* (*SD*)
WAT	TarThreat	1.53 (.90)	1.80 (.96)	1.66 (.94)
	NTarThreat	1.06 (1.06)	1.04 (.92)	1.05 (.99)
	TarNeutral	.46 (.65)	.37 (.64)	.42 (.64)
Intrusion D.	Day 1 Freq.	1.29 (1.12)	1.35 (1.21)	1.32 (1.16)
	Day 2 Freq.	1.15 (1.15)	1.24 (1.09)	1.19 (1.12)
	Day 3 Freq.	.34 (.59)	.54 (.77)	.44 (.69)
	Day 1 Dist.	2.14 (1.29)	2.62 (1.19)	2.43 (1.24)
	Day 2 Dist.	1.93 (1.47)	2.79 (1.17)	2.45 (1.35)
	Day 3 Dist.	1.71 (2.05)	2.69 (2.45)	2.31 (2.33)

Note: Low Dissociation at Encoding (Low Diss.); High Dissociation at Encoding (High Diss.); Word-Cue Association Task (WAT); Target Threat Words (TarThreat); Non-Target Threat Words (NTarThreat); Target Neutral Words (TarNeutral); Intrusion Diaries (Intrusion D.); Day 1/2/3 Intrusion Frequency (Day 1/2/3 Freq.); Day 1/2/3 Intrusion Distress (Day 1/2/3 Dist.).

For completeness, a correlational analysis was also performed to determine the relationship between conceptual priming and PTSD symptoms. The correlation between word-cue association task scores and intrusion frequency was weak (r = -.07, p = .40), as was the correlation between word-cue association task scores and distress of intrusions (r = .11, p = .18). This suggested that conceptual processing was not linked to PTSD symptoms.

Discussion

Research has suggested a link between high levels of dissociation and PTSD symptoms (i.e. flashbacks) (McCaslin et al., 2008; Lyttle et al., 2010; Briere et al., 2005; Murray et al., 2002; Ozer et al., 2003; Werner & Griffin, 2012), although no studies have been able to do this successfully using the TFP-A in an analogue design. In addition, theories of dissociation have predicted that impaired conceptual processing is likely to occur during high levels of dissociation (Lyttle et al., 2010; Halligan et al., 2003; Olsen & Beck, 2012; Huntjens et al., 2013). This study examined if laboratory-induced dissociation may lead to analogue PTSD symptoms, and explored the role of impaired conceptual processing during this process.

The spinning dot failed to induce dissociation. Therefore, spontaneous dissociation during encoding and retrieval was used as the independent variable.

This study did not support the hypotheses that those who experienced dissociation at encoding would have less conceptually-based recall compared to other conditions, those who experienced dissociation at encoding would have impaired conceptual priming for target-threat words compared to other conditions, or those who experienced dissociation at encoding would have more intrusions compared to other conditions.

Questionnaires

The results of the DES suggested that, overall, those who had high trait dissociation experienced higher levels of state dissociation during the study (i.e., high state dissociation was correlated with high trait dissociation). This was in line with previous research which had also noted a significant relationship between state and trait dissociation (Lyttle et al., 2010; Condon & Lynn, 2014).

The sub-measures of the DASS (depression, anxiety and stress) did not show a significant relationship with dissociation. The results from the STAI indicated higher overall levels of anxiety at encoding compared to baseline and retrieval in all groups. This suggested that the narrative was effective in producing an elevated arousal response when listening about a man being kidnapped and tortured by terrorists. This replicated the findings of previous studies (Krans et al., 2010; Dorahy et al., 2016) that suggested an audio-version of the TFP was comparable to the standard TFP as a means of inducing heightened analogue trauma.

Dissociation and Conceptual Processing

Contrary to current theories of PTSD, this study failed to support the role of conceptual processing in PTSD. There was no relationship between dissociation and impaired conceptual priming for target-threat words across groups. This suggested that target-threat words in general were more salient across conditions and that dissociation did not influence processing pattern. This result replicated the findings of Dorahy et al., (2016) and Lyttle et al., (2010) who also failed to find a link between dissociation and conceptual priming using a word-cue association task. One possible explanation for this finding could be that although target-threat words were more emotional compared to target-neutral words and in theory were more likely to be identified (Scott, O'Donnell, Leuthold, & Sereno, 2009), they may not have been sufficiently emotional to be influenced by dissociation. Furthermore, the results may be difficult to generalise to a clinical population, as identifying stimuli related to lived trauma is likely more powerful than identification with analogue stimuli in a word task. Future research should follow a similar procedure to Lyttle et al., (2010) and investigate the effects of conceptual priming in a clinical population to enhance the ecological validity of the study.

Interestingly, however, this study found that higher conceptual processing was associated with target-threat words compared to non-target threat or target neutral words, regardless of group. While this result contradicted the hypothesis based on the findings of Lyttle et al. (2010), it was a replication of a result from a recent study by Dorahy et al. (2016). This finding may have been due to the use of a non-clinical sample, which may have shown higher conceptual processing, and therefore higher conceptual priming in response to a low-level threat. This is compared to the clinical sample used by Lyttle et al. (2010), which may have shown reduced conceptual priming in response to distressing stimuli (similar to their own trauma experiences) (Dorahy et al., 2016).

The results from the narrative recall indicated no difference in the level of conceptual detail between high and low dissociation groups. A recent study which investigated a similar link between dissociation and conceptual processing using the same perceptual/conceptual rating scale also failed to find an association (Hooper, Dorahy, Blampied, & Jordan, 2014).

Several theories could account for why the results for this analysis were not significant. Firstly, although the perceptual/conceptual scale used for this study had been validated in other studies (Buck et al., 2006; Kindt et al., 2007) and ranged from one to nine, the recall scores found in this study clustered near the perceptual end (the lowest score for a participant's transcript was 6.24, while the overall average transcript score was 7.71). The trauma narrative *itself* may have influenced these scores, as the story was later coded by researcher two using the same perceptual/conceptual rating scale as the recall narratives, and was given a rating of 8.41 (indicating strong perceptual content). Giving the participants a significantly perceptually-based task may have explained why the recall scores were closely grouped around the perceptual end of the scale with little variance. In short, the scale in this study failed to capture conceptual priming, and while reduced conceptual processing was

predicted, it may not have been evident in this scale because of the actual content in the experimental narrative.

Another possible explanation for this finding could relate to the complex nature of conceptual processing. Although some studies have found a link between processing style and narrative recall details, this association seems to disappear when dissociation is included. For example, although the findings from Hooper et al. (2014) suggested that impaired conceptual processing in individuals who experienced the 2011 6.3 magnitude earthquake in Christchurch may have been related to an increase in PTSD symptoms, no association was found between state dissociation and impaired conceptual processing. Furthermore, the association between processing style and increased PTSD symptoms may have been the result of increased perceptual processing relative to conceptual processing, leaving the exact role of conceptual processing unclear. It is uncertain why this association disappears when dissociative experiences are taken into consideration. However, it likely suggests that conceptual processing has a far more complicated relationship with dissociation than perceptual processing, and that the latter is influenced by dissociation more than the former.

Although this study did not find a significant relationship between dissociation and conceptual processing, the role of conceptual processing should not be discounted entirely in trauma models. Many theories of PTSD have proposed that conceptual processing is a complex process that is currently not well understood, although it likely has an important role in peritraumatic experiences. Furthermore, as many studies have failed to show an association between impaired conceptual processing and PTSD symptoms, the results of this study could argue that perceptual processing and conceptual processing exist as independent systems (proposed by dual representation theory, Brewin et al., 1996). The positive association often found between perceptual processing and PTSD symptoms, along with failing to find an association between conceptual processing and PTSD symptoms may

indicate these processing mechanisms are not directly inversely related, but exist as separate systems.

Dissociation and Intrusions

This study failed to find an association between high levels of spontaneous dissociation and increased frequency of analogue trauma intrusions. Findings from previous studies have been mixed. Both Holmes et al., (2004) and Mairean and Ceobanu (2017) found that increases in spontaneous state dissociation after viewing a traumatic film predicted an increase in frequency of intrusions. However, other studies have failed to replicate this finding (Laposa & Rector, 2012; Hagenaars & Krans, 2011). It is currently unclear why different studies have found mixed results. One possible explanation for the finding in this study may be that dissociation at low levels measured in the laboratory, even if the exposure to unpleasant stimuli was present, may not have been potent enough to bring about increases in the frequency of intrusions. Future studies may benefit from investigating this link in a clinical sample immediately after experiencing an autobiographical distressing event, as this may likely provide a better understanding of the true relationship between dissociation and increased frequency of intrusions.

Despite the absence of a link between dissociation and subsequent traumatic intrusions, the frequency of intrusive memories decreased over the course of the three days following the TFP-A in all groups, suggesting there was some initial impact on participants from the distressing narrative. Although the frequency of intrusions did not significantly decrease on day two, intrusions significantly decreased and were very low by the third day.

Although the distress of intrusions did not change over three days, those in the high dissociation group experienced their intrusions as more distressing compared to the low dissociation group. One possible explanation for this finding is that those who experienced

high levels of dissociation may have had impaired processing of emotional material by not allowing emotional integration with other experiences and thereby not reducing initial distress associated with intrusions (DePrince & Freyd, 1999). This result was in line with a previous finding by Dorahy et al., (2016) and may suggest that the distress of intrusions could be a better predictor of PTSD symptoms than intrusion frequency (Michael, Ehlers, Halligan, & Clark, 2005; Dorahy et al., 2016). Hagenaars and Krans (2011) also suggested that dissociation was a symptom of severe distress that better predicted PTSD symptoms rather than induced dissociation using experimental manipulation. A mediation analysis could be useful in future studies to determine whether the distress of intrusions mediates the relationship between dissociation and other PTSD symptoms.

Conceptual Processing and PTSD Symptoms

This study failed to replicate this findings of Lyttle et al., (2010) which found a link between conceptual processing and PTSD symptoms in a sample of PTSD patients. However, the results of this study paralleled findings from Kindt et al., (2008) and Buck et al., (2009) which failed to find a link between conceptual processing and intrusion frequency using a non-clinical sample. This may suggest that the attempts to control conceptual processing in this study were relatively ineffective at predicting intrusion frequency, as conceptual processing has also been linked to PTSD symptoms using a non-clinical sample (Michael & Ehlers, 2007). Given the proposed link between distress of intrusions and PTSD symptoms, future studies may wish to further investigate the role that conceptual processing may have in this relationship in clinical and non-clinical samples.

Strengths and Limitations

One of the primary strengths of this study was the use of an analogue design to assess the relationship between dissociation, conceptual processing and PTSD symptoms. This was to control for PTSD variables while manipulating dissociation, which no prior study has been

able to do successfully using the TFP. Taking pre-existing PTSD characteristics into account (such as prior history of trauma) gave greater control over mediating factors. Overall, the experimental design ensured a well-controlled study in a laboratory environment with a standardised procedure.

Furthermore, the analogue study design allowed for a large sample size, which is often a restrictive component of clinical research. The total sample of 179 study participants was relatively large compared to other studies in the same field of research.

Despite the strengths of this study, several limitations may have influenced the outcomes. Firstly, the spinning dot did not produce elevated levels of dissociation. This was an unexpected finding as the spinning dot was near-identical to that used by Dorahy et al. (2016) which had successfully produced higher levels of dissociation compared to a control condition. One contributing factor in this study could have been that the spinning dot stimulus used may have been ineffective at inducing sufficient levels of dissociation. Including a red cross to ensure attention in this study may have achieved a result opposite to that intended and broken concentration on the task (i.e. disrupted the dissociative state) and lessened the potency of the stimulus to produce dissociation and resultantly heightened analogue intrusions. Although this result was not significant, it was in line with some previous studies which have attempted to induce dissociation in non-clinical samples with little success (Brewin & Saunders, 2001; Holmes et al., 2004). Dissociation appears difficult to induce in the laboratory and induction techniques should follow the exact procedures that have been successfully implemented in other studies. Analogue procedures may be relatively ineffective at measuring trauma outcomes compared to lived dissociative experiences (Marks et al., 2018).

Another limitation was the poor interrater reliability for coding of the perceptual/conceptual transcript scores. Although this indicated some incongruence in coding scores between raters, it likely did not influence the overall outcome of the rating scores as the narrative was highly perceptually-ladened, as noted earlier. Both, however, showed a strong leaning towards perceptual ratings. For example, the lowest score given to an individual's transcript (6.24) still contained more perceptual content than conceptual.

Technological and generational considerations may also help explain the findings of this study. Many of the participants noted during the study that the trauma story they listened to did not elicit a distressing response or an empathic connection with the story of the man in the narrative. With the rapid growth of technology and easily accessible explicit media (especially for a younger audience), by today's standards, the TFP-A may not have been an effective trauma-analogue compared to when the original TFP was developed. While anxiety was elevated, the stimuli may not have been emotive enough to produce an effect. This desensitisation effect could explain why many of the results were not significant, and why using a younger, technologically-savvy sample may have been a limitation of this study.

Finally, using an analogue study design decreased the ecological validity of the results. For example, using an analogue stimulus to induce dissociation, in addition to an analogue induction of trauma (TFP-A) will not have had the same potency as experiencing a traumatic event first-hand. This may make the results difficult to generalise to a clinical sample. In addition, this study design used a non-clinical sample of mostly college-aged undergraduate students, which also may make the findings difficult to generalise to a clinical population.

Directions for Future Research

Despite not finding a link between conceptual processing, dissociation and PTSD symptoms in this study, further research is warranted. Future studies would benefit from investigating conceptual processing using a similar analogue design, while using alternative measures of conceptual processing. An example may include a category instance generation task (Robert et al., 1997) where participants are asked to name as many items as possible in a given category (e.g. animals) in a limited time period. This is a form of free-association task which facilitates conceptual processing through semantic meaning retrieval mechanisms. Alternatively, this task could also be used to assess impaired conceptual processing in a clinical population of recent victims of trauma.

A similar analogue design using a different visual stimulus to induce dissociation could also benefit future studies. Although it was not entirely clear why the spinning dot did not induce the desired level of dissociation in this study, other dissociation-inducing stimuli could be used instead such as the mirror staring task (Dorahy et al., 2016). In this task, participants look at a mirror and stare intently into their own eyes during the presentation of the trauma stimulus. Using alternative dissociation-inducing stimuli in future research may further the understanding of the role of dissociation in an analogue study design. Efforts should also be made to develop stimuli which produce a similar effect to that of real-life dissociation, but still fall under the scope of ethically-approved research.

In addition, a more potent trauma analogue may need to be considered given the high levels of self-reported exposure to fast-paced, intense material with graphic violence common in study participants. This could potentially be measured and controlled for in future studies. Any modified simulated trauma would obviously have to balance the ethical imperative not to harm study participants with a realistic portrayal of a traumatic stimulus.

Conclusions

This study did not find a relationship between spontaneous dissociation and intrusion frequency or conceptual priming. However, high levels of dissociation were associated with more intrusion distress.

In light of these findings, the role of conceptual processing in trauma remains unclear. Few studies have been successful in linking dissociation with impaired conceptual processing, which may be due to the complex nature of how memory is processed during trauma and the limitations of replicating trauma in an analogue study with a non-clinical sample. What is clear, however, is that conceptual processing during an acute traumatic experience is not yet understood and requires further investigation.

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Appendices

Appendix A. *University of Canterbury Ethics Approval Notice*

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN ETHICS COMMITTEE

Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2018/12

13 April 2018

Michelle Jane Downs-Woolley
Psychology
UNIVERSITY OF CANTERBURY

Dear Michelle

The Human Ethics Committee advises that your research proposal "The Role of Dissociation and Memory in Analogue Distressing Narratives" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 11th April 2018.

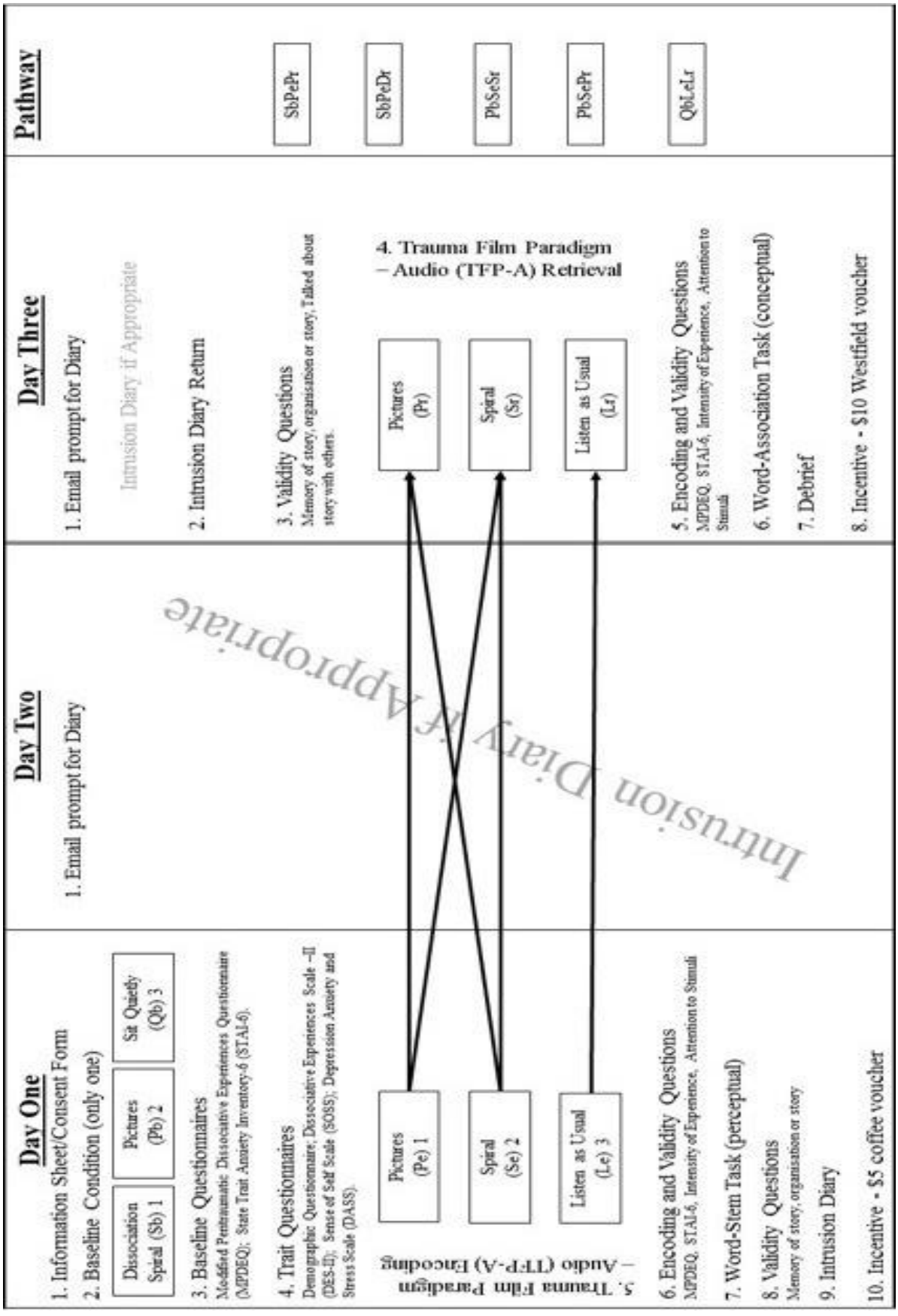
Best wishes for your project.

Yours sincerely

pp. R. Robinson

Professor Jane Maidment
Chair
University of Canterbury Human Ethics Committee

Appendix B. *Experiment Layout*



Appendix C. Information Form

College of Science
Department of Psychology
Telephone: +64 369 4337

Email:michelle.downs-woolley@pg.canterbury.ac.nz or
gareth.faulkner@pg.canterbury.ac.nz

Date:

The Role of Dissociation and Memory in Analogue Distressing Narratives

Information Sheet for Participants

My name is Michelle Downs-Woolley and I am a PhD Candidate in the Department of Psychology, and the principal researcher for this project. Gareth Faulkner is a Masters Student also working on this project. You are invited to take part in our research project entitled "The Role of Dissociation and Memory in Analogue Distressing Narratives".

This study aims to look at the effect that dissociation has on how people take in and remember information. Dissociation is the unintentional disruption in the normal integration of your experience into memory, where you lose track of what is going on around you by mentally switching off (i.e., daydreaming, working on auto-pilot). The study is split into *two sessions*:

1. Where participants receive information by listening to a story via an audio recording,
2. Where we ask participants to recall the story

These two sessions will be three days apart, and you will be required to attend both sessions to complete the study. The narrative that participants listen to depicts a journalist who was kidnapped by a terrorist group, tortured and ultimately killed. This narrative is based on a true story, and was compiled using first-hand accounts of those who were in captivity with the journalist and survived.

In the first session participants are given a number of questionnaires about their experiences during the study. When participants are listening to the story they will have to complete a visual task on the computer screen. We will also get you to complete two word tasks, one where you will be given a word, and then have to say the first word that comes into their head (word association task); the second where we give you the start of a word, and then you have to finish it (word stem task). At the end of session 1, participants are given a diary to record the amount of times they think about the story between sessions.

The second session will take place three days later, where participants will be asked to hand in their diary. Participants are then asked to recall the story in as much detail as they can, whilst completing another visual task. These recollections will be recorded. Participants will again be given short questionnaires regarding their experience.

Below is a schedule, and time estimates for each part of the experiment.

Measure Assessment	**Approximate time taken**
Session One	
Consent	5 minutes
Baseline measures	3 minutes

Questionnaires	15 minutes
Listen to Narrative	8 minutes
Questionnaires	2 minutes
Word Tasks	10 minutes
Thought Diary	A few minutes over the course of three days
Session Two	
Recalling Narrative	10 minutes
Questionnaires	5 minutes

In the performance of the tasks and application of the procedures there are risks of participants becoming distressed due to the content of the story. The narrative in the story is taken from true events and does depict potentially distressing events, such as torture and death. A list of support services is provided at the end of this document should you wish to talk to anyone about any distress that lingers after the study. You are also free to contact one of the researchers or their supervisor (Martin Dorahy, clinical psychologist) about your experience.

Participation is voluntary and you have the right to withdraw at any stage without penalty. You may ask for your raw data to be returned to you or destroyed at any point. If you withdraw, I will remove information relating to you. However, once analysis of raw data starts in October 2018, it will become increasingly difficult to remove the influence of your data on the results. If you were recruited via the PSYC105/106 Participant Pool you will receive 3 credits; whereas students recruited outside of the pool you will receive a $5 coffee voucher after the first session, and a $10 Westfield voucher at the conclusion of the second session.

The results of this project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your identity will not be made public without your prior consent. To ensure confidentiality no names will be used on the assessments or in the final report, nor will there be a record (once data has been added to the computer) of any identifying information. Any and all information that has identifying features (such as the consent form), will be kept by Michelle and Gareth, in their locked office, where the diaries will also be stored. The diaries will not have any personal identification, bar participant codes (i.e., Participant 1). Only the research team (e.g., Michelle Downs-Woolley, Gareth Faulkner, Martin Dorahy) will have access to the data, which will be stored securely and electronically by password protection. After the conclusion of the experiment Martin Dorahy will keep a copy of the data for ten years, after which it will be destroyed (this includes Intrusion Diaries). A thesis is a public document and will be available through the UC Library.

This project is being carried out as a requirement for a PhD Thesis by Michelle Downs-Woolley, and a Masters thesis by Gareth Faulkner, under the supervision of Professor Martin Dorahy who can be contacted at the email addresses below. Michelle, Gareth or Martin are be happy to address any concerns you have about participation in the project. If you agree to participate in the study, you are asked to complete a consent form.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

Gareth Faulkner
Phone: 0225740890
gareth.faulkner@pg.canterbury.ac.nz

Michelle Downs-Woolley
Phone: 02102464340
michelle.downs-woolley@pg.canterbury.ac.nz

Martin Dorahy
Phone: 03-3643416
martin.dorahy@canterbury.ac.nz

Support Services

Samaritans: 0800 726 666

Lifeline: 0800 543 354

Health Line: 0800 611 116

Counselling services

University of Canterbury Counselling service: (03) 364 2402

Petersgate Counselling Service: (03) 343 3391

Emergency services

Crisis Resolution/Psychiatric Emergency Service: (03) 364 0482 or 0800 920 092

Appendix D. *Consent Form*

College of Science

Department of Psychology

Telephone: +64 3

Email: michelle.downs-woolley@pg.canterbury.ac.nz or gareth.faulkner@pg.canterbury.ac.nz

The Role of Dissociation and Memory in Analogue Distressing Narratives

Consent Form for Participants

Name of researchers: Martin Dorahy (Clinical Psychologist/Professor, University of Canterbury); Michelle Downs-Woolley (PhD Candidate, University of Canterbury, Intern Psychologist); Gareth Faulkner (Masters Student, University of Canterbury); Simon Kemp (Professor, University of Canterbury).

Expected date of completion of study: December 2018.

- ☐ I have been given a full explanation of this project and have had the opportunity to ask questions.
- ☐ I understand what is required of me if I agree to take part in the research.
- ☐ I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.
- ☐ I understand that any information or opinions I provide will be kept confidential to the researchers, and that any published or reported results will not identify the participants. I understand that a thesis is a public document and will be available through the UC Library.
- ☐ I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after *ten* years.
- ☐ I understand the risks associated with taking part and how they will be managed.
- ☐ I understand that I can contact the researchers (Michelle Downs-Woolley at michelle.downs-woolley@pg.canterbury.ac.nz or Gareth Faulkner at gareth.faulkner@pg.canterbury.ac.nz) or supervisor (Martin Dorahy martin.dorahy@canterbury.ac.nz) for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz)
- ☐ I understand that my recollections will be audio recorded.
- ☐ I would like a summary of the results of the project (**optional**).
- ☐ By signing below, I agree to participate in this research project.

Name:_____Signed:_____Date:
Email address:____

Appendix E. *Instructions for Experiment*

Baseline Spinning Dot Condition Instructions:

For the next 3 minutes you will be required to watch a spinning dot in the centre of the screen. Please do not remove your gaze away from the centre of the dot. A red cross will randomly appear in the middle of the screen. When this happens please push the button indicated by the researcher on the box in front of you.

If your gaze moves away from the centre of the screen the researcher will gently redirect you back.

Baseline Picture Condition Instructions:

For the next 3 minutes you will be required to watch pictures move about the screen. Follow these pictures as they appear. Please do not remove your gaze away from the pictures. Red crosses will randomly appear about the screen. When this happens please push the button indicated by the researcher on the box in front of you.

If your gaze moves away from the pictures on the screen the researcher will gently redirect you back.

Baseline Control Condition Instructions:

For the next 3 minutes you will be required to sit quietly. Whilst you are sitting quietly, let your mind wander naturally.

Encoding Spinning Dot Condition Instructions:

We are going to test your memory. You are about to hear an audio clip depicting a first hand account of a man being kidnapped and tortured by terrorists. This clip is around 8 minutes long. A picture of this man will be presented for approximately 10 seconds before the visual stimuli begins. After 20 seconds the audio clip will begin.

We want you to listen carefully to the narrative, as you will be asked to recall it in detail. Try to focus on the meaning of the story and what is happening. During this clip you will be required to watch a spinning dot in the centre of the screen. If your gaze moves away from the centre of the screen the researcher will gently redirect you back.

During the narrative red crosses will appear randomly in the centre of the spinning dot. Whenever this happens, please press the button indicated on the box in front of you. If you feel the need to stop at any time, please let the researcher know.

Encoding Picture Condition Instructions:

We are going to test your memory. You are about to hear an audio clip depicting a first hand account of a man being kidnapped and tortured by terrorists. This clip is around 8 minutes long. A picture of this man will be presented for approximately 10 seconds before the visual stimuli begins. After 20 seconds the audio clip will begin.

We want you to listen carefully to the narrative, as you will be asked to recall it in detail. Try to focus on the meaning of the story and what is happening. During this clip you will be required to watch pictures travel around the screen. If your gaze moves away from the pictures on the screen the researcher will gently redirect you back.

During the narrative red crosses will appear randomly on the screen. Whenever this happens, please press the button indicated on the box in front of you. If you feel the need to stop at any time, please let the researcher know.

Encoding Control Condition Instructions:

We are going to test your memory. You are about to hear an audio clip depicting a first hand account of a man being kidnapped and tortured by terrorists. This clip is around 8 minutes long. A picture of this man will be presented for approximately 10 seconds before the screen goes dark. After 20 seconds the audio clip will begin.

We want you to listen carefully to the narrative, as you will be asked to recall it in detail. Try to focus on the meaning of the story and what is happening. If you feel the need to stop at any time, please let me know.

Retrieval Spinning Dot Condition Instructions:

I'm going to ask you to recall the memories of the narrative as vividly as possible, and in the order the events occurred.

Please recall this as best as you can.

Please watch the screen in front of you, keeping your gaze focused on the spinning dot in the middle of the screen. If your gaze moves away from the dot, the researcher

will gently redirect you back.

When a red cross appears please press the button on the box in front of you. Tell me what happened during the narrative in as much detail as you remember. This includes details about the character's activities.

Retrieval Picture Condition Instructions:

I'm going to ask you to recall the memories of the narrative as vividly as possible, and in the order the events occurred.

Please recall this as best as you can.

Please watch the screen in front of you, keeping your gaze focused on following the pictures as they move about the screen. If your gaze moves away from the pictures the researcher will gently redirect you back.

When a red cross appears please press the button on the box in front of you. Tell me what happened during the narrative in as much detail as you remember. This includes details about the character's activities.

Retrieval Control Condition Instructions:

I'm going to ask you to recall the memories of the narrative as vividly as possible, and in the order the events occurred.

Please recall this as best as you can.

Tell me what happened during the narrative in as much detail as you remember. This includes details about the character's activities.

Appendix F. *Trauma-Audio Narrative (TFP-A)*

Capture

My name is Max Jones, and I am a freelance journalist filing reports from Syria. I was travelling with Jack Castle, a British photographer. Jack and I were only 40 minutes from the Turkish border when we stopped at an internet café to upload our stories and photographs.

A tall man with eyes of pure evil and a big beard hiding most of his face came in. He went to a computer and sat for only a minute before leaving.

Once our task was complete, we packed up, and hailed a taxi for the drive to Turkey along with our local translator.

As we were winding through the streets a van sped up behind our taxi and cut us off. Masked fighters streamed out of the van, brandishing weapons and screaming at us in Arabic to lie on the pavement. They handcuffed us and threw us unceremoniously in to the van.

Interrogation One

We were taken to an abandoned factory and placed in separate cells. Armed guards stripped us of our personal belongings, their faces, actions and eyes all promising pain if we did not comply immediately. They then demanded the passwords for all our electronic devices. I refused and was beaten. The explosions of agony were unlike those I'd ever experienced, and I lost consciousness. I awoke, face down on the horrible, cold and sticky concrete floor. It wasn't until I sat up that I realised the stickiness was my own blood. They once again asked for my passwords, and I gave them immediately. As a consequence for my initial reluctance I was rewarded with a vicious kick to my ribs. The pain I felt whenever I breathed confirmed to me that I had broken ribs, leaving me unable to take more than shallow breaths.

They left me in my cell for hours without food or water, with nothing to distract me from the pain I felt. I was not, however, without hope. Surely someone would rescue us. Then my cell door was thrown open.

Interrogation Two

I screamed and tried to fight back as they dragged me out, my ribs and chest aching the whole time. I was heaved into a room and handcuffed to a rail above my head. All of my electronics were strewn across a table. They had checked my laptop, tablet and phone for information about me and my work. They thought I was a spy. I was stripped and suspended naked whilst they checked for a GPS chip hidden under my skin, or a microphone within my clothes. They left me there and then came back with knives, chains and a steel poker that they heated red-hot over a fire. Each was used on me repeatedly as they took immense pleasure in dehumanizing me. I could feel each instrument penetrating, piercing and searing my skin. I screamed as they burned and whipped me. The wounds were instantly cauterized by the hot bar, so I did not bleed to death. There were no reasons for their actions other than punishment and their own amusement. No questions were asked, no information demanded.

Torture Two

We were eventually moved to a basement prison underneath a Hospital, where my torture continued. Sometimes cruel beatings would occur, and at other times a more heinous act would take place in a room we called "The Shower". My first visit to that room was burned into my memory like the scars of torture were burned into my flesh. The room was pitch black beyond the pool of light in the centre, but you could hear the sound of water. I was forced to lie on a table in a reclining position, with a cloth sack over my head. I can still feel it's rough texture scraping my face and restricting my breathing. Without any warning a torrent of ice-cold water was poured over my face and into my mouth. I couldn't breathe. I couldn't see. I was drowning on dry land, and my gaolers were laughing. They revelled in my pain. The burn in my throat as I tried to breathe was driving me insane. Even when the water stopped I couldn't breathe - the wet sack over my face was preventing that. This went on for hours. Or at least I was told it was hours. Time meant nothing in that room. You were marooned on an island of terror, with no air, no light, and no one to help you. When we saw hostages brought back to the cell we waited to see if they were covered in blood or water. Beatings at least reminded us that we were needed for information. Waterboarding was entertainment.

Ransom

After about 13 months of this horror we were told to hand over the email addresses of our nearest relatives so they could be sent ransom notes. I gave the address of my youngest brother. I could only gain some small relief knowing that at least my family would know that I was alive. I was beginning to feel hopeful. I might go home. It was then we realised that only certain prisoners were being routinely freed. Freedom came for those whose countries paid ransoms – my country did not. The realisation crushed me. It was then that I knew I was never getting out.

The End

I am scared to die. The cell door opens, and I am forced to wear an orange jumpsuit and a cloth bag over my head. My hands were bound with rope. For the first time in months I am

led out side. I am shoved into a vehicle. After what seems like hours I am led out of the vehicle and the bag is taken off my head. I see desert. I see black clad figures. I see cameras. And I see a sharp blade, shimmering in the blazing light of the sun. I am led to a point in front of the camera and placed on my knees. One of the black clad figures steps up beside me and picks up the long, sharp blade. The Arabic word for action is yelled out, and the cameras are turned on. I do not listen to the ugly words of anger and self-righteousness that my executioner is spouting, I am done with this world. I wait, and wait until finally I feel the icy pain of the blade on my neck breaking the skin and I am gone.

Appendix G. *Word-Cue Association Task*

Word Association Target Neutral Words

Cue Word	Total Frequency	Frequency per Million	Association to Target	Target Word	Total Frequency	Frequency per Million
Sand	21,112	36.56	3	Desert	21,312	36.90
Patient	45,040	77.99	7	Hospital	66,553	115.24
Enjoyment	3,485	6.03	5	Amusement	3,785	6.55
Newspaper	31,283	54.17	3	Journalism	8,556	14.82
Boundary	4,965	8.60	3	Border	32,470	56.23
Averages	21,177	36.67	4.2		132,676	45.95

Word Association Target Threat Words

Cue Word	Total Frequency	Frequency per Million	Association to Target	Target Word	Total Frequency	Frequency per Million
Torment	1,216	2.11	3	Torture	7,689	13.31
Hurt	43,203	74.81	6	Painful	13,431	23.26
Bad	123,592	214.01	5	Evil	19,968	34.58
Nasty	7,397	12.81	5	Horrible	11,557	20.01
Freezing	5,337	9.24	3	Cold	70,610	122.27
Averages	36,149	62.60	4.4		24,651	42.69

Word Association Non-Target Threat Words

Cue Word	Total Frequency	Frequency per Million	Association to Target	Target Word	Total Frequency	Frequency per Million
Slaughter	3,931	6.81	5	Killing	27,705	47.97
Blast	8,591	14.88	3	Bomb	18,711	32.40
Dislike	2,938	5.09	6	Hate(d)	26,194	45.36
Thief	4,015	6.95	5	Steal	8,438	14.61
Horns	3,740	6.48	4	Devil	9,130	15.81
Averages	4,643	8.04	4.6		18,035.6	31.23

The frequency per million was by taking the total frequency (1990-2017) divide it by 577,500,000 (number of words total in Corpus), then multiplied by 1,000,000 – thus creating a score per million for the whole corpus.

Appendix H. *Intrusion Diary*

Date and Time of Original Session: Date/Time of Next Session:

_____ _____

Intrusion Diary

Over the next 3 days please take time to fill out the following thought diary (starting as soon as you leave today).

We would ask you to put in any thoughts/memories/images about the scenario you heard at the lab, occurring when you had not intended to think about the scenario. These are called intrusive images and ***occur spontaneously, not when you are intentionally thinking about the project****.*

You are being asked to record the number of intrusions you have, when you have them, a brief description of the intrusion, the type of intrusion you have, the feelings that accompany the intrusion and how distressing it was to you using the ratings below.

Emotion Type:

1. Neutral
2. Interest
3. Joy
4. Sadness
5. Surprise
6. Anger
7. Disgust
8. Fear
9. Shame
10. Guilt
11. Amusement
12. Anxiety
13. Other: Please state.

At the end of the 3 days, before you come to the Lab, please fill out this next question:

To what extent did you feel you were able to record in the diary all your thoughts/memories/feelings about the story you heard on a scale of 0 (*Never remembered to write down the thoughts/memories/feelings)* to 10 (*Always remembered to write down the thoughts/memories/feelings)*

0 1 2 3 4 5 6 7 8 9 10

Distress Scale:

0 – Totally relaxed, no emotion

1- Alert and awake, concentrating well, or an inkling of feeling something
2- Minimal emotion
3- Mild emotion, no interference with performance

4- Somewhat upset to the point that you cannot easily ignore an unpleasant thought. You can handle it ok but don't feel good.
5- Moderate emotion, uncomfortable but can continue to perform
6- Feeling emotion to the point that you begin to think something ought to be done about the way you feel.
7- Quite emotional, interfering with performance
8- Very emotional, can't concentrate
9- Extremely emotional
10- Highest emotion you have ever felt.

Intrusion Type:

Audio (A): a line of dialogue or voice from the narrative intrudes into your thought process.

Visual (V): A picture or image.

Audio and Visual (AV): A combination of both an audio and visual intrusion.

You will receive an email prompt each morning to complete your intrusion diary. Please try and keep this on you at all times, and record whenever you have an intrusion. Please be as accurate as possible in your descriptions. If you need a new diary at any time, please feel free to contact the researcher at: michelle.downs-woolley@pg.canterbury.ac.nz

Example Diary Entry:

DAY ONE:

	Time	Description of Intrusion and Trigger	Type of Intrusion	Emotion	Distress
Morning	9am	Hearing my lecturer's voice saying "The test is worth 30% of your grade" in my thoughts when I started to study.	A	13 Stressed	4
	10am	Image of a failed exam paper burst into my mind when I was sitting down to a practice test.	V	12 Anxious	3

DAY ONE:

	Time	Description of Intrusion and Trigger	Type of Intrusion	Emotion	Distress
Morning					
Afternoon					
Evening					
Night					

DAY TWO:

	Time	Description of Intrusion and Trigger	Type of Intrusion	Emotion	Distress
Morning					
Afternoon					
Evening					
Night					

DAY THREE:

	Time	Description of Intrusion and Trigger	Type of Intrusion	Emotion	Distress
Morning					
Afternoon					
Evening					
Night					

Appendix I. *Debrief Form*

Department of Psychology

Telephone: +64 03 369 4337

Email: michelle.downs-woolley@pg.canterbury.ac.nz or gareth.faulnker@pg.canterbury.ac.nz

Date:

Debriefing form

The Role of Dissociation and Memory in Analogue Distressing Narratives

This study was interested in the effect that dissociation whilst listening to, and recalling emotional information, has on memory. Dissociation is the unintentional disruption in the normal integration of your experience into memory, where you lose track of what is going on around you by mentally switching off (i.e., daydreaming, working on auto-pilot, zoning out). It includes times where events are happening in front of you, but your brain is not paying attention. To help us examine this we gathered information using the Dissociative Experiences Scale - II (DES-II) (propensity to dissociate), the Modified Peritraumatic Dissociation Experiences Questionnaire (M-PDEQ) (current dissociation), the State-Trait Anxiety Inventory-6 (STAI-6), and the Depression, Anxiety and Stress Scale (DASS).

To investigate this further, we got participants to listen to a story, and then in the next session recall it, to assess not only what they remembered but how they remembered it. To do this we divided participants randomly into five groups. We then used the audio version of the Trauma Film Paradigm (TFP-A) where participants listened to a narrative of a journalist who was captured by a terrorist group. Variations on the TFP have been used to study memory and trauma for a long time (Holmes & Bourne, 2008). Details of this story were taken from interviews with other hostages who were in captivity but survived. This narrative is told from the first person point of view to capture the experience. The names in the narrative were changed to protect their identities and as a mark of respect. An article by the New York Times was used as the main source of information.

Visual tasks were used to control participants ability to dissociate. A third of the participants watched a spiral to induce dissociation, another third watched neutral pictures on the screen as a non-dissociation condition, whilst the final third were a control group and listened to the story as usual, that is, without having a visual focus. We also needed to check whether these tasks had an influence on dissociation or anxiety levels, so these tasks were also given without audio before the story was heard. To keep the stimuli novel however, participants only completed the baseline measures, which they *were not* going to receive whilst listening to the narrative.

We are also interested in how memories are recalled; therefore, participants returned to the lab three days later and were asked to recount as much information about the story as possible. We were again interested in how dissociation affected memory; therefore, participants were again divided into groups. Random group assignment for retrieval groups occurred where participants were in either the spiral or the pictures group, or were put in the listen as usual group. This latter group acted as a control.

We also sought information that indicates whether specific emotional words from the narrative (target words, such as, Hostage) were more easily remembered than either neutral or emotional words (Non-target words, such as Defy), which did not feature in the story – when prompts that may remind people of the target word are given. This is called perceptual priming. To test this, we conducted a Word-Stem Task (WST), where participants were required to complete word lists. We want to see whether participants will recall words which were in the narrative, over other possible words that fit the same beginning, i.e., Mis_____, could be Mis*ery* or Mis*ter*, where the word Misery featured in the story. We also had participants complete a Word-Association Task (WAT) where they were given a word, and then asked to say the first word that comes into their head, which if priming is operating, will be in the narrative (i.e., Sand → Desert, where the word Desert featured in the story). This is called conceptual priming.

We are also interested in the effect of dissociation on sense of self (beliefs about the self, and who you are), which we measured with the Sense of Self Scale (SOSS). We also asked participants to complete the revised Impact of Events Scale - 6 (IES-6) to control for any post-traumatic stress symptoms experienced.

If you feel the need to talk to anyone about the effect this study has had on you, a list of support services has been attached at the end of this debriefing form. If you want further information about the study, you can contact the researchers. Our contact details are below.

Michelle Downs-Woolley

Phone: 02102464340

Email: michelle.downs-woolley@canterbury.ac.nz

Gareth Faulkner

Phone: 0225740890

Email: gareth.faulkner@pg.canterbury.ac.nz

Martin Dorahy

Phone: 03-369 4337

Email: martin.dorahy@canterbury.ac.nz

Support Services

Samaritans: 0800 726 666

Lifeline: 0800 543 354

Health Line: 0800 611 116

Counselling services

University of Canterbury Counselling service: (03) 364 2402

Petersgate Counselling Service: (03) 343 3391

Emergency services

Crisis Resolution/Psychiatric Emergency Service: (03) 364 0482 or 0800 920 092

Appendix J. *Advertisement Flyer*

PSYC100-level

Sign up through

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What's in

- **$5 Coffee Voucher**

AND

- **$10 Westfield Voucher**

OR

- **PSYC 105/106 Course Points**

Contact :

Gareth Faulkner or Michelle Downs-Woolley for more information!

Participants Wanted

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

We are conducting a study that looks at whether, and how dissociation (e.g. losing track of time, daydreaming) affects an individual's ability to take in and remember emotional information.

Participants would be required to attend **two short sessions**:

- Listen to a short audio recording of a man being captured by terrorists, and answer some questions (40mins max.)
- Three days later come and recall what we did in the first session (20mins max.)

If you wish to take part in our study and are over 18, please contact Gareth Faulkner at

Gareth.faulkner@pg.canterbury.ac.nz, or Michelle Downs-Woolley at michelle.downs-woolley@pg.canterbury.ac.nz for details.

Supervisor:

Martin Dorahy martin.dorahy@canterbury.ac.nz

This study has been approved by the Human Ethics Committee (HEC 2018/12).